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5 Star Hotel

Vishakhapatnam, Andhra Pradesh, India

Dec, 2025

5 Star Hotel

Vishakhapatnam, Andhra Pradesh, India

BACHELOR OF ARCHITECTURE

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MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY, BHOPAL

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5 Star Hotel

Vishakhapatnam, Andhra Pradesh, India

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UNDER THE GUIDANCE OF

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MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY, BHOPAL

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The Thesis Project in the subject ARC 511, entitled "**5 Star Hotel, Vizag, India"**, is being submitted in partial fulfilment of the requirement for the award of degree of Bachelor of Architecture by the undersigned for evaluation.
The matter embodied in this project is a record of my own work. If, in future, it is found that the above statement is false, then I have no objection in withdrawal of Bachelor of Architecture Degree awarded to me by the Institute.

Date: 1st – 2nd Dec, 2025 **Shreya Mahule**
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RECOMMENDATION

Based on the above declaration of the student, the undersigned recommends that the work submitted by the candidate may be considered for the final end term examination of the subject ARC-511, Thesis Project.

Date: 1st – 2nd Dec, 2025 **Dr. Seemi Ahmed**

Thesis Guide

CERTIFICATION OF EXAMINATION

The Bachelor of Architecture Thesis Viva-Voce examination of Ms Shreya Mahule Scholar No.211110015, was held on 1/12/2025 to 2/12/25.

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ABSTRACT

This thesis explores the idea of **Affordable Luxury**, where a five-star hotel can deliver high comfort, wellbeing, and memorable experiences while remaining environmentally responsible and financially accessible. The project is set in **Visakhapatnam**, a coastal city with a strong Navy legacy, the spiritual presence of **Narasimha Swamy**, and a deep connection to the sea and hills. These elements shape the hotel's character, interiors, material palette, and overall storytelling.

The design focuses on **user wellbeing**, with naturally lit spaces, cross-ventilation, shaded outdoor zones, biophilic elements, and intuitive circulation that create a calm and balanced guest experience. Local cultural cues, natural textures, and landscape integration ensure the hotel feels rooted in the identity of Vizag rather than a generic luxury property.

A key aspect of the project is its **net-zero approach**, achieved through low-energy planning, rainwater harvesting, greywater reuse, passive cooling strategies, and efficient services. The construction system uses **low-carbon materials**—Ferrock instead of RCC, AAC and Agrocrete blocks instead of bricks, coffee-husk composite instead of aluminium panels, and Vedic plaster instead of cement plaster—resulting in a dramatic reduction in embodied carbon.

The final outcome demonstrates that luxury can be **sustainable, culturally grounded, emotionally enriching, and environmentally regenerative**, creating a five-star hospitality model that is future-ready for coastal cities like Vizag.

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CHAPTER I

DESIGN BRIEF

1.1 BRIEF ABOUT THE PROJECT

Visakhapatnam Metropolitan Regional Development Authority (VMRDA) proposes for Development of Convention Centre & 5 Star Hotel / Resort with Other Water Entertainment Facilities in Visakhapatnam on Public Private Partnership (PPP) Basis (the "Project"). The proposed site admeasuring 7.97 acres (approx.) is situated on a prime land along beach road at Visakhapatnam, Andhra Pradesh. The proposed development is envisaged on Design, Finance, Build, Operate and Transfer ("DFBOT") format of PPP.

Table 1 Project Details

S. No.	**Item**	**Description**
1	**Project Title**	Development of a Convention Centre with not less than 5 Star Category Hotel / Resort & other Waterfront Entertainment Facilities on PPP basis in Vizag.
2	**Authority**	Visakhapatnam Metropolitan Regional Development Authority (VMRDA), Visakhapatnam, Andhra Pradesh.
3	**Project Site**	10.97 Acres (including waterbody) of land along Beach Road, Visakhapatnam, Andhra Pradesh.
4	**Minimum Development Obligations (MDOs)**	**1. Convention Centre & 5 Star Category Hotel / Resort** to be developed within 36 months: **(i) A Convention Centre comprising:** a) Multi-purpose air-conditioned hall with a minimum 15 ft ceiling; seating for 2500 people in theatre style. b) Partitioned flexible hall with no fixed seating for multiple events. c) Capable of hosting National & International level Meetings, Events, and Exhibitions. **(ii) 5 Star Category Hotel / Resort comprising:** a) Minimum 200 guest rooms. b) 5 Star certification from HRACC, Ministry of Tourism, India, within 180 days of operations. **2. Other Waterfront Entertainment Facilities** to also be implemented within 36 months.
5	**Waterfront Entertainment Facilities**	To be implemented within 36 months in accordance with applicable CRZ norms: (i) Shack Restaurants / Cafés (temporary structures/canopies) (ii) Party Lawns with landscaping/hardscaping (e.g., Amphitheatre) for outdoor events (iii) Flea Market (iv) Exhibition Venue **Note:** MDOs are subject to applicable Development Control Regulations. Additional tourism facilities listed in the Andhra Pradesh Tourism Policy 2020–2025 may be developed if permissible under CRZ norms.

6	**Regulatory Clause**	If any MDO is not currently permissible under existing Development Control Regulations or CRZ norms, its implementation shall begin after such regulations are amended to permit them.
7	**Other Obligations / Conditions**	a) Adopt water conservation, recycling, rainwater harvesting, zero discharge of wastewater (if possible), and energy-efficient utilities. b) Ensure accessibility for differently-abled individuals per the Persons with Disabilities Act, 1995 and UNCRPD. c) The Concessionaire shall be responsible for obtaining all statutory approvals, licenses, and clearances.

1.2 SITE LOCATION & FEATURES

Name of the Project: 5 Star Category Hotel with Convention Centre & Waterfront Activities.

Location: Along beach road, Vishakhapatnam, Andhra Pradesh India**.**

Site Coordinates: 17°43'22.65"**N** 83°20'24.48"**E**.

Total Site Area = 43537.45 Sq. M (10.97 ac.)

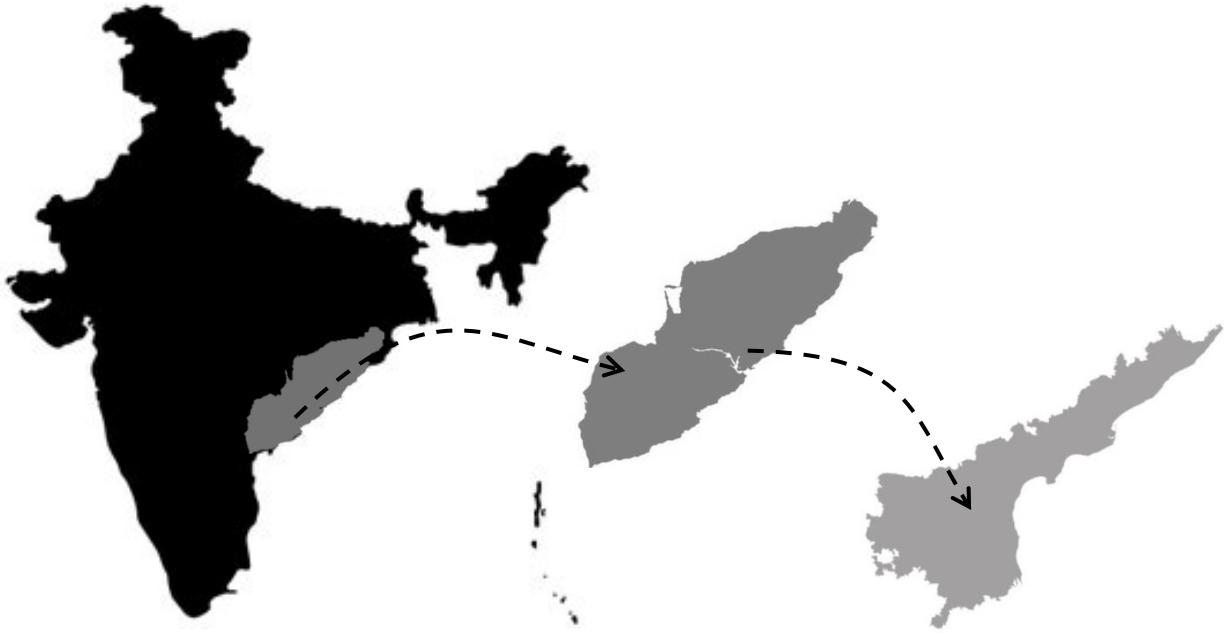


Figure 1 Site Location



Figure 2 Location Map

2.2.1 SITE PHOTOGRAPHS

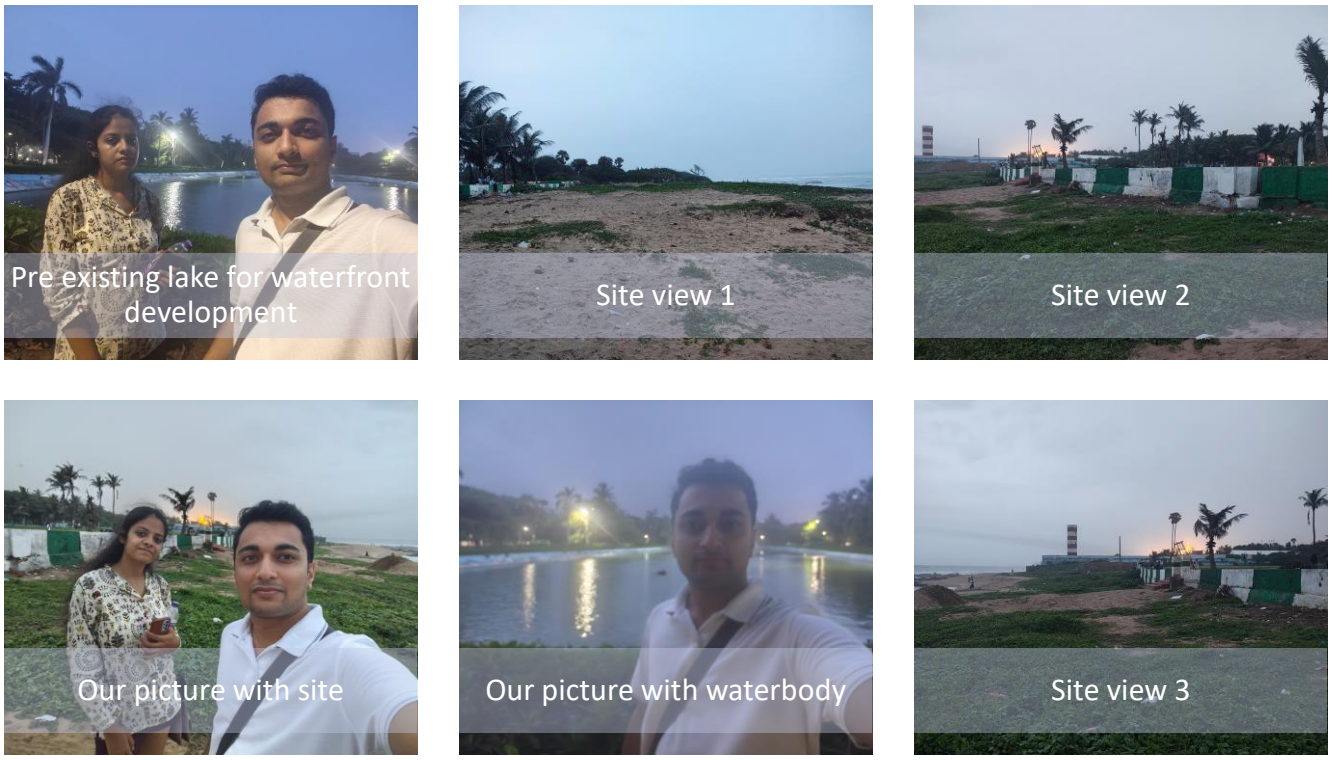


Figure 3 Site pictures

Table 2 Site details

S.no.	Description	Proposed
1.	Site area (sqm)	43625.112
2.	Site area (acre)	10.78
3.	Ground coverage	30%
4.	F.a.r.	2.5
5.	Max builtup area (sqm)	109,062.78
6.	Mos	10 m
7.	Building height	Upto 40 m
8.	Land use	Mixed use type 3
9.	CRZ	II
10.	Seismic zone	II

11.	Horizontal clearence of HTL	2.5 km
12.	Parking percentage	30%

2.2.2 LAND USE

This section examines the site's immediate surroundings and broader urban context to evaluate its integration, market viability, and community impact. It covers land use and zoning regulations, adjacent developments, local demographics, and Visakhapatnam's





PROPOSED STRATEGIC LANDUSE ZONING

- Residential Use Zone
- Mixed Use Zone - 1
- Mixed Use Zone - 2 (BAIA)
- Mixed Use Zone - 3 (BAIA)
- Mixed Use Zone - 4 (BAIA)
- Existing Industrial Area
- Existing Recreational, Play grounds, Parks & Layout Open Space
- Water Body Buffer
- Proposed Recreational Use Zone
- Existing Transportation Facility
- Proposed Transportation Facility Use Zone
- Agricultural Use Zone
- Brown Zone (Hills)
- Special Area Use Zone
- Blue Zone (Water Bodies)
- Green Zone (Forest)
- Kambalakonda WildLife Sanctuary/ Biodiversity Area
- Kambalakonda Eco Sensitive Zone/ NAOB Buffer, Zoological Park
- Sea / River Accreted Land

PROPOSED NODES

- AeroCity
- Mother City
- IT Hill
- ECO Park
- Heritage
- NH Centre
- Regional Centre
- Sub City/Sub CBD
- Tourism Node
- Transit Node

PROPOSED TRANSPORTATION NETWORK

- Proposed BRTS
- Proposed Suburban Railway
- Proposed Metro
- Proposed Railway Line
- Regional Bypass
- VK-PCPIR Expressway
- Beach Road
- Arterial Roads
- Sub-Arterial Roads

EXISTING TRANSPORTATION/ INFRASTRUCTURE

- National Highway
- State Highway
- Major District Roads
- Other District Roads
- Village Roads
- Existing BRTS Road
- Railway Line
- HT Power line
- Contour Line

economic and tourism landscape, essential factors influencing the feasibility and strategic positioning of the proposed 5-star hotel and convention center.

Table 3 Existing Land Use and Zoning Classification of Site and Immediate Surroundings (Illustrative)

Category	**Description / Classification (Illustrative)**	**Relevance to Project**
Site Current Land Use	Vacant / Recreational	Basis for development potential and required change of use if applicable.
Site Zoning Classification	Tourism Zone / Mixed-Use (as per VUDA Master Plan)	Defines permissible uses, scale, and density of development.
Permitted FAR/FSI	2.5 (CRZ II)	Direct impact on building massing, floor area, and economic viability.
Permissible Building Height	Upto 40 meters (Illustrative, subject to CRZ & Airport Clearances)	Influences architectural design, views, and urban skyline integration.
Minimum Setbacks	10 M from all sides, for 24 m wide road	Shapes site layout, open spaces, and compliance with regulations.
Adjacent Land Use (North)	Residential (Low-Rise)	Potential for noise/privacy conflicts, need for buffer zones.
Adjacent Land Use (South)	Public Open Space / Beach Access	Opportunity for integration, pedestrian linkages, public amenities.
Adjacent Land Use (East)	Bay of Bengal (Waterfront)	Direct interface for waterfront activities, CRZ implications.
Adjacent Land Use (West)	Commercial / Arterial Road (NH16)	Access, traffic impact, commercial synergy.

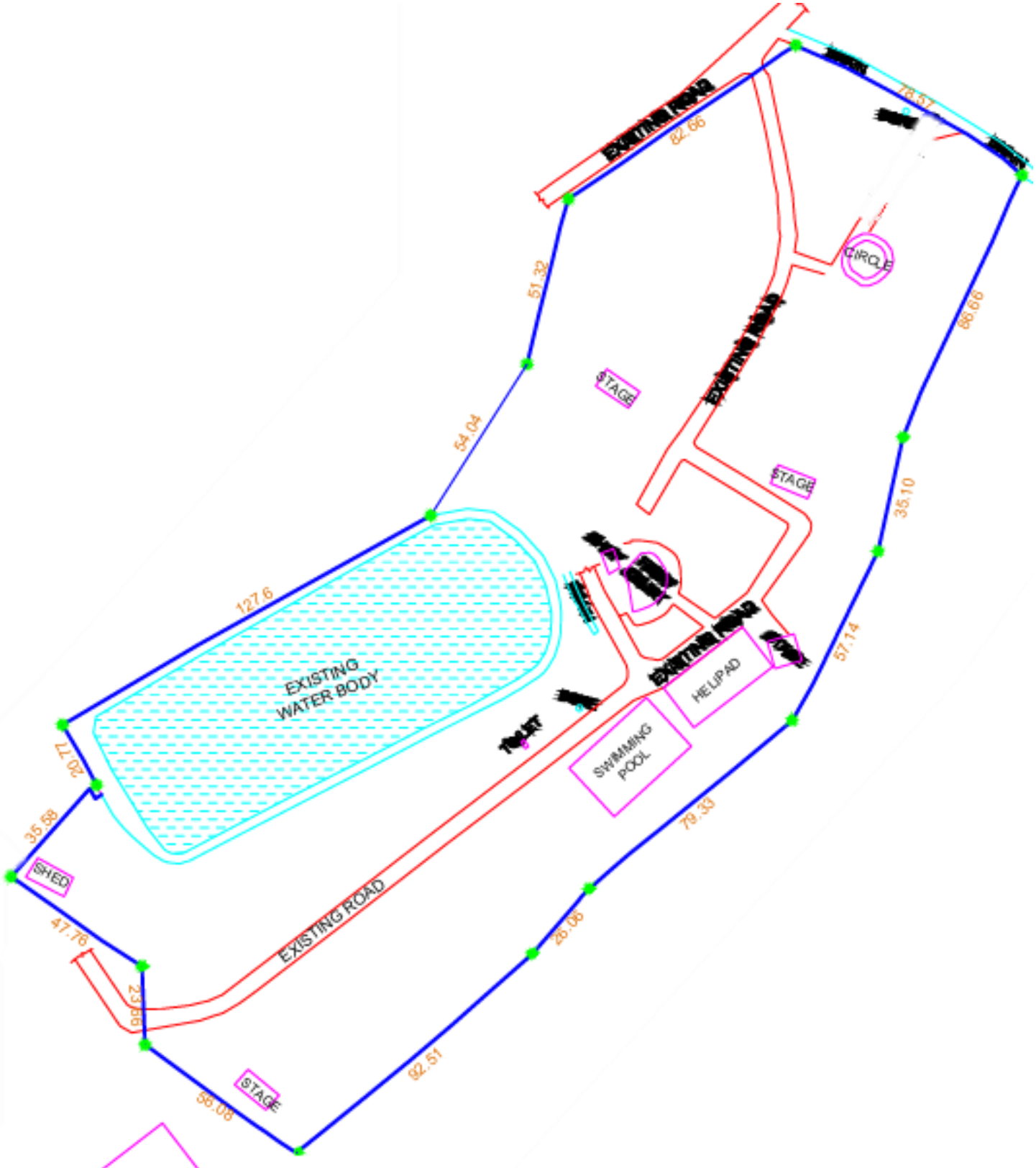


Figure 5 Site dimensions

REFERENCES

CHAPTER 2

LITERATURE SURVEY

2.1 OVERVIEW

The word hotel is derived from the French hotel (coming from hotel meaning host), which referred to a French version of a townhouse or any other building seeing frequent visitors, rather than a place offering accommodation. In contemporary French usage, hotel now has the same meaning as the English term, and hotel particular is used for the old meaning.

2.2 APPLICABLE RULES

Table 4 Applicable development control & regulation

S. No.	**Description of Parameter**	**Applicable Standards**	**Remarks**
1	Development Controls and regulations	Andhra Pradesh Building Rules – 2017 (G.O. Ms. No. 119, MA&UD, Dt. 28.03.2017) and amendments thereon, and National Building Code (NBC).	Any other applicable regulations/stipulations of any other statutory authorities applicable in the Local Body.
2	Andhra Pradesh Tourism Policy 2020-2025	Development / Activities shall be limited to those listed in the Policy.	Any other development / activity not listed in the Policy shall be prohibited.
3	VMRDA Master Plan 2041	G.O. Ms.No.136 dated 08.11.2021, MA&UD – VMRDA Perspective Plan 2051 & Master Plan 2041, and subsequent amendments, if any.	Development / Activities shall be limited to those listed in the Master plan. Any other applicable regulations/stipulations.
4	Coastal Regulation Zone (CRZ 2011)	Coastal Regulatory Zone Notification by the Ministry of Environment & Forest, GoI, 2011.	Any other applicable regulations/stipulations of any other statutory authorities.
5	Coastal Regulation Zone (CRZ 2019)	Coastal Regulatory Zone Notification by the Ministry of Environment & Forest, GoI, 2019, as and when made applicable in the State of Andhra Pradesh, and	Any other applicable regulations/stipulations of any other statutory authorities, as and when made applicable.

		subsequent amendments, if any.	
6	Hotel and Restaurant Association Classification Committee	Certification of Star Category from HRACC, Ministry of Tourism, India.	Any other applicable regulations/stipulations of any other statutory authorities.
7	Spatial planning and architectural design guidelines	Urban Development Plans Formulation & Implementation guidelines (UDPFI) and Time Saver Standards.	Any other applicable regulations/stipulations of any other statutory authorities.
8	Facilities for Persons with Different (Differently abled Persons)	Persons with Disabilities Act, 1995 with subsequent amendments and 'UN Convention for Rights of Persons with Disabilities (UNCRPD).	Any other applicable regulations/stipulations of any other statutory authorities.
9	All Pavements, Roads, and Signage	Indian Road Congress (IRC) & Ministry of Road Transport and Highways (MORTH) specifications.	Any other applicable regulations/stipulations of any other statutory authorities.
10	Building construction including structures, utilities, infrastructure facilities, etc.	National Building Code (NBC) regulations.	Any other applicable regulations/stipulations of any other statutory authorities.
11	Fire Protection and Detection Services.	National Fire Protection Authority (NFPA) regulations.	Any other applicable regulations/stipulations of any other statutory authorities.
12	Performance Standards	ISO 9001: 2008	Any other applicable regulations/stipulations of any other statutory authorities.

2.2.3 LOCAL BYELAWS

2.2.4 Andhra Pradesh Tourism Policy 2020-2025

Policy Vision & Strategic Alignment

To sustainably develop tourism in Andhra Pradesh and position the State as one of the most preferred tourist destinations through development of luxury resorts, and by providing world-class tourism products and experiences.

Table 5 APTP vision

Aspect	**Relevance to Proposed Project**
Focus on luxury tourism	Directly supports 5-star resort/convention projects
Emphasis on MICE & waterfront tourism	Strong fit with integrated development concept
Large-scale investment focus	Project qualifies as a 'Mega Tourism Project'
Long policy validity (until Mar 2025)	Covers new units + ongoing ones from previous policy
Commitment to continuity	Reduces regulatory risk, increases investor confidence

Classification & Eligibility: Mega Tourism Projects

Definition: Mega Tourism Project

Table 6 Mega tourism project

Criteria	**Description**
Investment Threshold	₹400 Cr and above
Hotel Classification Requirement	5-Star and above, with MoT certification
Entity Requirement	At least one consortium partner must have experience in operating 5/7-star
Timeline	Commercial operations between Dec 2020 – Mar 2025

Implication:

Unlocks specialized incentives, fast-track approval, and 'Industry' status.

Incentives & Financial Concessions

Major Incentives Offered**:**

Table 7 Incentives under APTP

Incentive Type	**Details**

Industry Status	Access to industrial land, utility benefits, financing schemes
100% Land Use Conversion Waiver	Subject to regulatory permission
100% Stamp Duty Reimbursement	For purchase, lease, mortgages, hypothecations
100% SGST Reimbursement	For 5 years or until 100% fixed capital investment recovered
Power Tariff Subsidy	₹2.00/unit reimbursement for 5 years from COD

Impact:

Significantly reduces CapEx and OpEx, improving IRR and viability of luxury projects.

Approval Process: Streamlined & High-Level

Stages of Approval

1. **DPR Submission** → Reviewed by Tourism Department Evaluation Committee
2. **CEO APTA Review** → CEO provides official remarks
3. **SIPC & SIPB** → State-level investment promotion bodies evaluate and recommend
4. **Cabinet Approval** → Final decision with highest-level political commitment

Note: Additional incentives may be offered *case-by-case*, based on project merit.

Land Allotment Policy: Flexibility & Long Tenure

Tenure & Extent

Table 8 Land allotment under APTP

Feature	**Detail**
Maximum Land	No fixed cap — decided case-by-case
Lease Tenure	Up to 90 years (+4-year construction grace period)
Payment Deferment	Optional 2-year deferment or until COD, repayable in 8 quarterly EMIs
Lock-in Period	2 years post-COD (restrictions on sale/mortgage)

Allotment Methods

Table 9 Allotment methods

Method	**Details**
Lease Rent Basis (ALR)	Highest Annual Lease Rent; reserve price = 1% of SRO land value
Lease + Revenue Share (ADP)	ALR + share of gross revenue or minimum assured amount (whichever higher)
Freehold Basis	Through SIPB with adherence to norms

Land Use Conditions

Obligation	**Compliance Rule**
Use of Land	Exclusively for the intended project; changes need govt. approval
Mortgage/Transfer Restrictions	Allowed only with government permission (land itself not mortgageable)
Implementation Milestones	Must be met to retain land lease

Convention Centres (MICE Tourism): Dedicated Support

Strategic Fit with State Vision

Table 10 MICE tourism

Policy Viewpoint	**Relevance to Proposed Project**
MICE as blend of business & leisure	Supports integrated convention + waterfront development
Engagement with star hotels	Aligns with 5-star property as potential hub
Govt. co-marketing & coordination	Enhances visibility and logistical support

Minimum Eligibility Criteria for MICE Projects

Table 11 Eligibity MICE

Parameter	**Requirement**
Seating Capacity	Minimum 1,000 pax
Built-up Area	At least 10,000 sq.ft.
Integrated Hotel	Minimum 3-Star (Ministry of Tourism-certified)

Government Action Plan for MICE

Table 12 Action plan

Initiative	**Description**
New Hub Identification	Expanding MICE locations across state
Mega-MICE Star Hotel Projects	Targeted partnerships with large hotel brands
Stakeholder Coordination	Airlines, tour operators, event managers to be engaged in development

Strategic Advantages for Investors

Key Benefits

Table 13 Strategy for investors

Area	**Benefit**
Policy Continuity	Reduces regulatory uncertainty
High-Level Oversight	Cabinet approval ensures commitment at the highest level
De-risking Incentives	Upfront and operating cost reductions (SGST, power, land use)
Long-Term Security	90-year lease + flexibility in payment, development terms
Strategic Fit (MICE + Waterfront)	Aligns fully with targeted tourism themes

2.2.5 Policy on Waterfront Development

Andhra Pradesh's Coastal Potential & Policy Focus

Table 14 Coastal potential policy

Aspect	**Details**
Coastline Length	974 km
Tourism Focus	Beach and water-based tourism identified as priority sectors
Blue Flag Certification	Rushikonda Beach certified – represents global standards for safety, hygiene, and sustainability
Policy Objective	Promote premium tourism while ensuring ecological compliance and international-quality standards

Definition – Blue Flag Certification: An international eco-label awarded to beaches and marinas that meet high environmental and safety standards.

Development of Water Villas

Table 15 Water villas

Policy Provisions	**Details**
Responsible Body	Andhra Pradesh Tourism Authority (APTA)
Functions of APTA	Site identification, feasibility studies, investor facilitation
Regulatory Compliance	Strict adherence to CRZ norms and environmental laws
Private Investment Role	Encouraged through de-risked entry points via pre-vetted sites and support infrastructure

Definition – Water Villas: Luxury accommodations built over or adjacent to water bodies, offering exclusive waterfront experiences.

Development of Beach Shacks

Table 16 Beach shacks

Aspect	**Details**
Development Approach	Private operators selected through transparent bidding process
CRZ Compliance	Mandatory – all development must follow Coastal Regulation Zone guidelines
Operator Responsibility	Construction, operation, hygiene, safety, and adherence to all regulations
Shack Specifications	Within 500m of approved tourist beaches, max 1 storey, max 200 sq.m., min 10 seats for dining

Water Sports & River/Sea Cruises

Table 17 Water sports

Category	**Minimum Requirements**
Water Sports	Activities like kayaking, rafting, scuba, etc. must follow MoT/GoI safety guidelines
Water Ride Facilities	Must be tourist-focused, not for public transport; operator registration mandatory
River Cruises	Minimum 25 pax, onboard dining and entertainment required
Sea Cruises	Minimum 50 pax, with lodging, dining, and recreational services
Infrastructure Support	Government to invest in marinas, jetties, and boating facilities

Action Plan for Beach & Water-Based Tourism

Table 18 Action plan for water based tourism

Planned Action	**Purpose**
Water Sports Hubs	Identify and cluster beach zones with integrated offerings like villas and shacks
Blue Flag Expansion	More certified beaches to attract high-end and eco-conscious tourists

Strategic Benefit: If the resort project lies within these clusters, it gains from coordinated infrastructure and shared branding.

2.2.6 Andhra Pradesh Building Rules – 2017

Hotel development in Andhra Pradesh is regulated by the *Andhra Pradesh Building Rules – 2017*, issued under G.O.MS.No.119 (March 28, 2017), based on the *Model Building Bye-*

Laws 2016. These rules aim to create a safe, inclusive, sustainable, and business-friendly construction environment across urban and industrial jurisdictions.

Hotels are explicitly excluded from the "residential" category and instead classified under commercial, public, and high-rise standards. This distinction subjects them to stricter requirements on design, safety, accessibility, and infrastructure. Depending on facilities, hotels may fall under multiple categories—commercial/mercantile, high-rise, assembly (banquet/conference halls), public building, or multiplex-linked projects (with mandatory block separation).

Key provisions include:

Minimum Plot Size: 2000 sq.m. for hotels/conference halls, reinforcing their treatment as large-scale urban projects.

Compliance Areas: Planning, structural safety, fire protection, environmental sustainability, and accessibility.

Impact Fees: Payment of tiered City Level Infrastructure Impact Fees for urban development.

Sustainability Mandates: Energy efficiency via APECBC compliance, water recycling, and solar energy use.

Safety Standards: Robust fire/emergency systems and multi-agency clearances, especially for high-rise structures.

Compliance with Andhra Pradesh Energy Conservation Building Code (APECBC)

Hotels in Andhra Pradesh must comply with the mandatory APECBC, regardless of size. They are required to achieve an *AP (One Star)** energy rating through either a prescriptive or performance method, certified by an empanelled architect at plan approval and again before occupancy. This ensures energy efficiency is integrated from design to operation.

Accessibility for Differently Abled, Elderly, and Children

Hotels, as public buildings on plots above 2000 sq.m, must provide universal access. Provisions include wide, non-slip walks, accessible parking, ramps, lifts, refuge areas, and barrier-free sanitary facilities. Corridors, doors, and signage are designed for wheelchair users, visually/hearing impaired persons, and elderly guests, promoting inclusive hospitality.

Restrictions on Hotel Development

Hotel projects require multiple clearances due to environmental, defense, aviation, heritage, and infrastructure sensitivities. Restrictions apply near airports, defense areas,

heritage sites, pipelines, railways, religious structures, government precincts, and water bodies. EIA clearance is mandatory for projects over 20,000 sq.m. Careful site due diligence is essential to avoid delays.

Building Components and Space Standards

Minimum dimensions: Office/workspace ≥ 6 sq.m (width 2.1m); clear headroom ≥ 2.4m.

Balconies: Up to 2m projection from 6m height in high-rises.

Basements: Allowed for plots ≥ 750 sq.m, mainly for parking/utilities; must follow strict rules on ventilation, setbacks, fire safety, and compartmentalization.

Bathrooms/WCs: Require natural/mechanical ventilation, watertight finishes, proper drainage, and separation from kitchens. Connection to sewerage or septic tank is mandatory.

Table 19 Sanitary requirements for hotel

Sanitary Unit	***For Residential Public Staff***	***For Non-Residential Staff (Male)***	***For Non-Residential Staff (Female)***	***For Public Rooms (Male)***	***For Public Rooms (Female)***
Water Closet (WC)	1 per 8 persons (min 2 if both sexes lodged)	1 for 1-15 persons, 2 for 16-35, 3 for 36-65, 4 for 66-100	2 for 1-13 persons, 4 for 13-25, 6 for 26-40, 8 for 41-57, 10 for 58-77, 12 for 78-100 (add 1 per 6 persons over 100)	1 per 100 persons up to 400; add 1 per 250 over 400	2 for 100 persons up to 100; add 1 per 100 over 200
Ablution Taps	1 in each WC	1 in each WC	1 in each WC	1 in each WC	1 in each WC

Urinals	Nil up to 6 persons, then tiered (1 per 7-20, etc.)	Nil	Nil	1 per 50 persons	Nil
Wash Basins	1 per 10 persons	1 per 15 persons, then tiered	1 per 1-12 persons, then tiered	1 per WC/Urinal	1 per WC
Baths	1 per 10 persons	Nil	Nil	1 per 10 persons (showers)	N/A
Cleaner's Sink	1 per 30 bedrooms (min 1 per floor)	Nil	Nil	1 per 30 bedrooms (min 1 per floor)	N/A
Kitchen Sink	1 in each Kitchen	1 in each Kitchen	1 in each Kitchen	1 in each Kitchen	1 in each Kitchen

Note: Hotels must provide separate facilities for staff and guests, with a 2:1 male-to-female ratio assumed in public rooms. One water tap per 50 persons is required, ensuring hygiene and adequate capacity planning.

Table 20 Staircases, corridors, ramps & lifts in hotels

Component	Key Provisions
Staircases	• Minimum **2 staircases** (one enclosed, one external) for hotels and public buildings.• Non-combustible, enclosed, self-contained units.• No staircase around lift shafts (for >15m buildings).• Width: **1.5m** (residential hotels & all hotels).• Treads: 30cm; Risers: 15cm; Handrail: 90cm; Headroom: 2.2m.• Fire escape staircases: independent, non-combustible, min. 1.25m width, direct to ground.• Spiral stairs: only for <9m height, min. dia. 1.5m.

Corridors/Passageways	• Minimum width: **1.5m** for hotels and similar public buildings.• Protected lobbies (double fire doors) required for >24m height.
Ramps	• Not in mandatory setbacks; allowed inside/rear with 7m fire path.• Width: 2 ramps of 3.6m or 1 ramp of 5.4m (for cars).• Gradient: 1:8 (cars), 1:15 (heavy vehicles), 1:10 max for accessibility. • Wheelchair ramps: min. width 1.2m, slope ≤1:10, non-slip, handrails on both sides. • Rest platforms at 10–12m intervals.
Lifts	• Mandatory for buildings >15m (without stilts) / >18m (with stilts).• At least **one accessible lift** for wheelchair users (1100mm x 2000mm cage, 900mm door, 1800mm x 1800mm lobby).• Audible/visual indicators, handrail, auto-closing doors (≥5 sec).• Lifts not considered fire escape; must have grounding switch.• Fire lifts mandatory in high-rises.
Escalators	• Permitted in addition to lifts, mainly in public/atrium areas.

Kitchen and Service Area Specifications

Hotel kitchens must have impermeable floors, proper waste connections, and natural ventilation (minimum 1 sq.m or 1/10th floor area window).

High-rise kitchens require strict LPG safety: separate shafts for gas pipes, shut-off valves, thermal detectors, and automatic exhaust tripping to prevent fire hazards. Fume hoods, insulated wiring, and accessible gas storage at ground level ensure safety in large-scale cooking operations.

Interior and Exterior Open Spaces & Height Regulations

All habitable rooms must abut open spaces for light and ventilation; mechanical ventilation is required otherwise. High-rises must provide setback areas strong enough for 45-ton fire tenders.

Up to 25% of setback can be sunk for basements without hindering fire movement. Height limits depend on adjoining street width and aerodrome clearance.
Interior courtyards must be at least 9 sq.m (up to 15m height) or 25 sq.m (above 15m).

Mandatory open spaces must remain unobstructed, except for limited projections like chajjas or pergolas.
FAR exclusions—such as lift rooms, pergolas, canopies, sky bridges, swimming pools, and landscaping features—allow design flexibility while safeguarding fire safety and ventilation.

Lighting and Ventilation

Habitable rooms must have windows, glazed doors, or ventilators opening to external air/verandah (≤2.4m wide).

Openings (excluding doors) ≥1/10th of floor area; no part of a room >7.5m from a light source.

If natural light/ventilation isn't feasible → artificial/mechanical systems per NBC Part-VII.

Bathrooms/Toilets without external openings → ventilation shafts (size varies with building height, e.g., 1 sq.m up to 10m height → 9 sq.m above 24m).

Shaft not required if mechanical ventilation provided.

Parking Requirements

Parking allowed in basements, stilt floors, upper floors, open areas beyond setbacks, or common pool parking.

Mechanical/two-tier parking permitted; basements can be continuous between buildings (with safety checks).

Stilt floors: may include watchman room + 2 toilets (max 25 sq.m).

Ramps: 2 × 3.6m wide or 1 × 5.4m wide; slope 1:8. Not permitted in mandatory setbacks; driveway min. 4.5m.

Visitors' parking: ≥10% of total, in side/rear setbacks >6m (not in front setback).

Parking area requirement: Hotels = 30% (corporation areas) / 25% (smaller municipalities).

Misuse of parking areas → subject to removal/demolition.

Table 21 Fire safety norms

Category	Requirement	Details / Standards
Legal Clearance	Andhra Pradesh Fire Service Act, 1999	Prior clearance mandatory for: (i) Buildings ≥15m height; (ii) Public congregation bldgs. ≥500 sq.m plot area or height >6m.
	Clearance Process	Submit form + certified plans (by Fire Consultant/Architect) to APSDR&FSD →

		Approval → Forward to sanctioning authority. Final clearance before Occupancy Certificate.
	Renewal	Annual renewal mandatory for Assembly, Business, Mercantile buildings >15m and Public Buildings (via Fire Consultant/Architect undertaking).
Fire Resistance	Building Components	As per NBC 2005 Part IV, Tables 2–18. Structural members must meet prescribed fire resistance ratings.
Means of Access & Exit	Fire Escapes	Not counted in main stair req. Must lead directly to ground, 125cm wide, 25cm tread, max 19cm riser, max 16 risers/flight, 100cm handrail. For bldgs. >24m: Fire Tower required. Spiral stairs only ≤9m height, min Ø 150cm.
	Staircase Enclosures	Walls: Brick/RCC, 2-hour resistance. Doors: Self-closing, 1-hour resistance, swing outward. Ventilation: permanent vents at each landing (1–15% cross-sectional area), shaft roof ≥1m above roof. Core staircases: 5mm positive pressurization.
Basement Safety	Ventilation & Access	Mechanical extractors, smoke venting, alternative power supply, compartmentation, drainage required.
High-Rise Provisions	Helipad	Mandatory for bldgs. >60m, with AAI approval + structural safety certification (IIT/NIT).
Service Ducts & Shafts	Enclosure	2-hour fire-rated walls/doors. >10 sq.m ducts sealed with fire-resistant materials. Vent opening ¼–½ shaft area.
	Refuse Chute	Non-combustible, 2-hour resistance, away from staircase shafts, fitted with 1-hour inspection panels/doors.
Electrical Safety	Cables	In separate ducts, sealed floor-wise. Water/gas/telecom prohibited in electrical ducts.
	Circuits	Separate conduits for pumps, lifts, pressurization fans. Master switches clearly labeled. MCB/ELCB required.
	Sub-Station	Independent access, 24/7 entry, 4-hour fire-rated walls, cable trenches 0.6m×0.6m, transformer sump capacity = oil volume, dry-type transformers preferred.

	Generator	Mandatory standby DG set for lighting, fire pumps, lifts, PA system, exit signs, smoke extraction, dampers. Auto start required.
Air-Conditioning & Dampers	AC Ducting	Non-combustible metal ducts, auto dampers at fire separation walls, AHU separate per floor, smoke extraction shafts for bldgs. >24m.
	Fire Dampers	Automatic + manual operation, gravity closure with fusible link.
Boiler Room	Location	Not in sub-basements. Fire-resisting room (4-hour), at periphery, 2-hour composite entry door, smoke exhaust to atmosphere.
Mandatory Firefighting Installations	Installations	Wet risers, down comers, hose reels, sprinklers, hydrants, UG tank, terrace tank, fire pumps, first-aid extinguishers, auto detection, manual alarm, PA system, emergency lights, DG set, exit signs, hose boxes, refuge area, compartmentation.
Static Water Storage	UG Tank	Exclusive firefighting supply, capacity as per APSDR&FSD, 4×63mm inlets, slab load capacity: 45t (high-rise), 22t (low-rise).
	Automatic Sprinklers	Mandatory for: (i) Hotels <15m with ≥1000 sq.m/floor or basement; (ii) Hotels ≥15m; (iii) All bldgs. ≥24m; (iv) Basements ≥200 sq.m; (v) Underground shopping/parking. Relaxations possible if sprinklers installed voluntarily ≤24m.
Fire Alarm & Control Room	Alarm Systems	Manual electrical alarm mandatory ≥15m; Automatic alarm required unless sprinklers provided. Call box distance ≤22.5m, break-glass type, battery backup (48 hrs).
	Control Room	At entrance floor, PA system, floor plans, equipment logs, 24/7 manned by trained firefighting staff.
Fire Drills & Staffing	Drills	As per NBC Appendix B; Fire Orders approved by APSDR&FSD.
	Fire Officer	Required for: (i) Hotels ≥15m + 150 beds; (ii) Hotels ≥3-star; (iii) High-rise >30m; (iv) Hospitals >100 beds; (v) Underground shopping >1000 sq.m.
Housekeeping & Smoking	Standards	Strict cleanliness, no accumulation of waste, proper waste receptacles, systematic parking. Smoking prohibited in basements and combustible zones.

Fire Prevention	Restrictions	No storage of flammable liquids (except approved genset tanks). No cooking/tea prep outside kitchens. No heaters in basements/service areas. No naked flames except in kitchens.
Material Restrictions	Interior Materials	No combustible/flammable materials for partitioning, paneling, false ceilings. No materials emitting toxic gases. False ceiling framework must be metallic. Surface finishes = Class I flame spread.

Table 22 Water supply and sanitation norms

Category	Requirement	Details / Standards
Regulatory Code	NBC 2005 (Part-9: Plumbing Services)	Section 1: Water supply, drainage & sanitation (incl. solid waste mgmt.); Section 2: Gas supply.
Per Capita Water Requirement	Hotels with lodging (per bed)	**180 L/day**
	Hotels (5-star & above)	**340 L/day**
Water Storage	Underground tank	**200 L per person** capacity, with pumping to upper floors.
Dual Water Supply System	Potable water	Drinking, cooking, bathing only.
	Non-potable (groundwater/tube well)	Flushing, gardening, other non-potable use.
Plumbing Design	Low-capacity cisterns	Preferred to reduce wastage.
Sanitary Unit Requirements	Guestrooms & staff facilities	Provision of WCs, urinals, wash basins, baths, cleaner's sinks, kitchen sinks as per NBC standards (separately for staff & public use).
Filtered Water Connection	Scope	Allowed **only** for drinking & bathing.
Water Recycling (Mandatory)	Applicability	Sites **≥1000 sq.m** (residential, nursing homes, hospitals, hotels).
	Condition	Recycling system **mandatory**; compliance to be verified **before Occupancy Certificate** issue.

Rainwater Harvesting (Table-35)	Category	Commercial/Mixed-use (includes hotels).
	Plot Area	**All plot sizes**
	Provisions	(i) RWH structure, (ii) Soft landscape with percolation pits, (iii) Common treatment plant as part of integrated dev.
	Conditions	Emphasis on **storage + reuse**. Must show **stormwater drainage plan, RWH structure, recharging well**.

2.3 MINISTRY OF TOURISM, INDIA

2.4 HRACC (HOTEL AND RESTAURANT APPROVAL CLASSIFICATION COMMITTEE)

Table 23 HRACC

Star Rating	Minimum Requirements
1 Star	- Shower or bathtub in all rooms- Daily room cleaning- Color TV with remote- Table and chair- Soap or body wash- Reception service- Fax service- Guest telephone- Extended breakfast- Beverage offer- Deposit facility
2 Star	- Reading light by bed- Bath essence or shower gel- Bath towels- Linen service- Sanitary products- Credit card acceptance- Breakfast buffet
3 Star	- Internet access in room- Reception open 14 hrs, phone 24 hrs- Luggage service- In-room telephone- Heated bathroom, hairdryer, tissues- Dressing mirror & luggage rack- Sewing kit, shoe polish, laundry & ironing- Extra pillow & blankets on request- Complaint management system
4 Star	- Reception open 18 hrs, phone 24 hrs- Lobby with seating & beverage service- Breakfast buffet or in-room breakfast menu- Minibar or 24-hr room beverage service- Couch & side table- Bathrobe & slippers on demand- Cosmetic products
5 Star	- Reception open 24 hrs- Multilingual staff- Concierge, page boy- Spacious reception with multiple seating areas & beverage service- Personalized greeting (flowers/gift/drink)- 24-hr room F&B & minibar- Internet & terminal- Room safe- Ironing & shoe polish service- Evening turndown service- Mystery guest audits

Design Considerations – Room Layout Types

Table 24 Room layout types

Layout Type	Key Features
Double Loaded Corridor	- Most economical- Needs 2 staircases- 16–24 rooms/floor (60 ft width)
Double Loaded T-shaped Corridor	- Needs 3 staircases- Economical use of space
Single Loaded Corridor	- Not economical- Desirable with ample space- 12–30 rooms/floor (32 ft width)
Square Block	- Central service core- Compact design- Ideal for small sites/tower layout
Y Plan	- Complex- Requires 3 staircases- Challenges in public area design
Tri Arc Plan	- Similar to Y plan- More space required- Curved rooms, large bathrooms
Circular Plan	- Risk of awkward inward-facing rooms- 16–24 rooms per floor
Circular with Central Core	- Compact like square block- Risk of poor room planning

Structural Regulations – As per Municipal Authorities

Table 25 structural regulations as per HRACC

Area	Requirements
Emergency Response	- Alarms must be reported immediately to fire brigade- Regular fire drills (every 3 months)- Participation by all occupants- Maintain records for 3 years
Signage Requirements	A. **Lift Landing Signs**: Clear, large font, visible, contrasting color, stair use in fireB. **Floor Number Signs**: Prominent display on each floorC. **Staircase/Elevator Signs**: Clearly indicate elevator/stair on each floorD. **Re-entry Signs**: Show if re-entry allowed on that floorE. **Building Floor Plan**: Shared with nearest fire station
Eco-Friendly Practices	- Safe solid & liquid waste disposal- Renewable energy (solar/wind) use earns extra classification points

Systematic Layout Planning (SLP)

Definition & Purpose

Table 26 SLP defination

Aspect	**Details**

Definition	Systematic Layout Planning (SLP) is a structured and rational method for developing efficient layouts by analyzing interrelationships among people, materials, equipment, and processes.
Purpose	To ensure the quickest material flow, minimal handling cost, and most logical spatial arrangement at the lowest overall cost.
Use Case	Applies to both mini-hotels (where space is critical) and large hotels (which may include banquet halls, terraces, etc.)

Key Elements of SLP

Table 27 Key elements of SLP

Element	**Explanation**
1. Relationships	Defines the closeness required between different areas/functions.
2. Space	Involves size, shape, and configuration needs of the layout.
3. Adjustments	Realistic optimization and final arrangement of layout elements.

Objectives of SLP

1 Minimize equipment investment

2 Minimize production time

3 Minimize material handling cost

4 Maximize space utilization

5 Maintain operational flexibility

6 Provide comfort to employees

Planning Phases in SLP

1 Determine area and location for departments

2 Establish general overall layout

3 Develop detailed layout plans

4 Install the selected layout

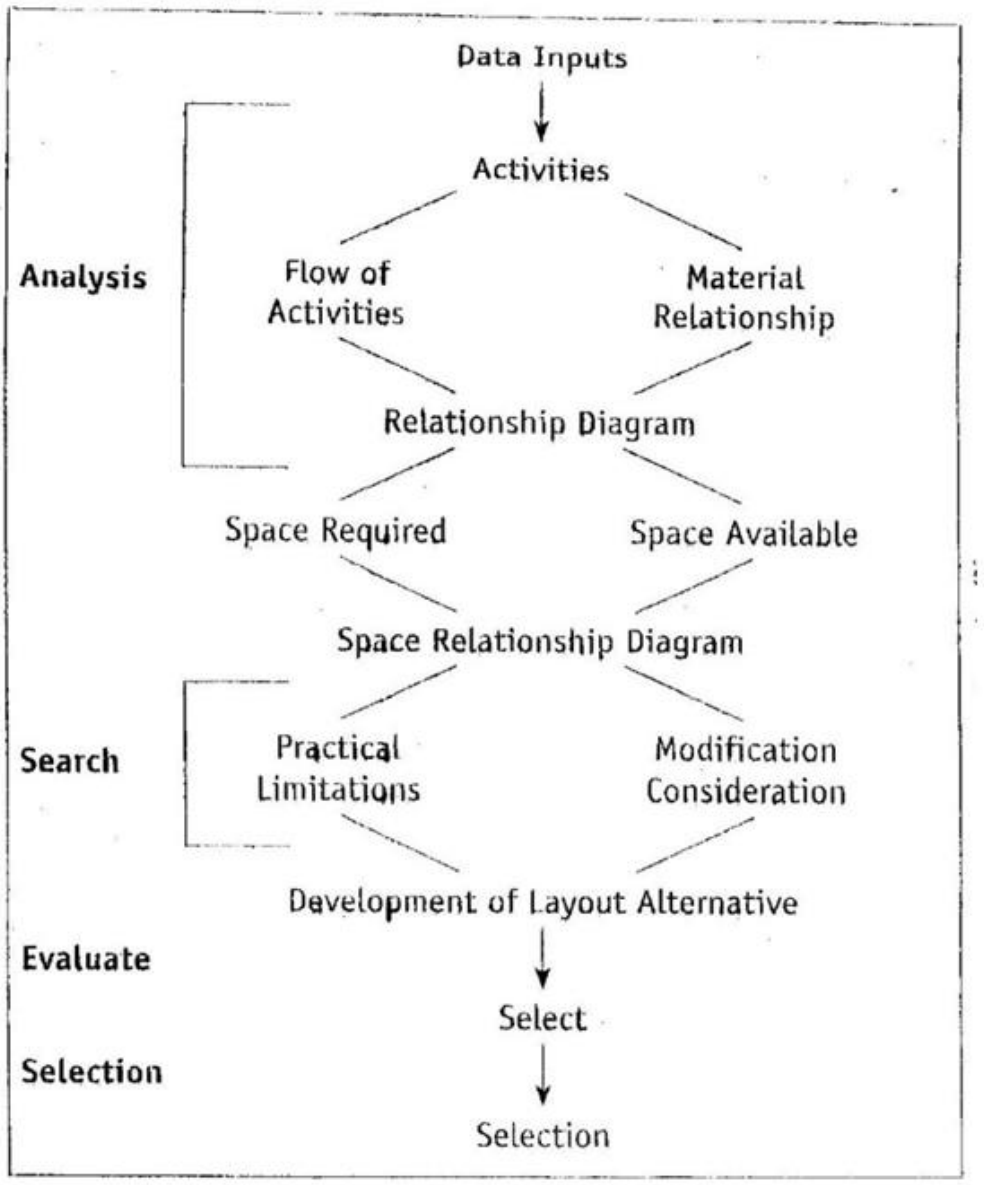


Figure 6 Step Systematic Layout Planning Process

Thumb rule for space allocation in hotels

Table 28 Thumb rule

Facility Type	**Component**	**100 Rooms**	**200 Rooms**	**500 Rooms**	**1000 Rooms**
1. Food Production	Main Kitchen	1100 sq.ft	2000 sq.ft	9000 sq.ft	18000 sq.ft

	Pantry	0	0	1200 sq.ft	1200 sq.ft
	Bakery	0	0	850 sq.ft	1000 sq.ft
	Room Service Kitchen	75 sq.ft	75 sq.ft	300 sq.ft	500 sq.ft
	Chef's Office	100 sq.ft	100 sq.ft	120 sq.ft	120 sq.ft
	Dry Food Storage	150 sq.ft	300 sq.ft	1000 sq.ft	1800 sq.ft
	Refrigerated Food Storage	100 sq.ft	200 sq.ft	500 sq.ft	1000 sq.ft
2. F&B Service	Coffee Shop	1200 sq.ft	2400 sq.ft	3500 sq.ft	4400 sq.ft
	Specialty Restaurant	0	0	2800 sq.ft	4000 sq.ft
	Bar	400 sq.ft	800 sq.ft	2000 sq.ft	2800 sq.ft
3. Housekeeping	Executive HK Office	100 sq.ft	100 sq.ft	125 sq.ft	150 sq.ft
	Secretary	0	0	100 sq.ft	100 sq.ft
	Linen Storage	300 sq.ft	500 sq.ft	1500 sq.ft	3000 sq.ft
	Uniform Storage	100 sq.ft	250 sq.ft	500 sq.ft	800 sq.ft
	Supplies Storage	100 sq.ft	100 sq.ft	100 sq.ft	200 sq.ft
	Lost and Found	0	100 sq.ft	150 sq.ft	200 sq.ft
	Laundry	0	1000 sq.ft	2500 sq.ft	4000 sq.ft
	Valet	0	100 sq.ft	150 sq.ft	200 sq.ft
	Laundry Supervisor	0	0	100 sq.ft	120 sq.ft
4. Front Office	Front Office Manager	0	120 sq.ft	120 sq.ft	120 sq.ft
	Bell Desk Storage	0	150 sq.ft	200 sq.ft	300 sq.ft
	Safety Deposit Lockers	0	30 sq.ft	60 sq.ft	60 sq.ft
	Front Desk	0	160 sq.ft	250 sq.ft	450 sq.ft
	Reservations	0	80 sq.ft	200 sq.ft	250 sq.ft
	Telephone Operator	0	80 sq.ft	200 sq.ft	250 sq.ft

Necessary and desirables spaces from ministry for tourism

General & Guest Room Facilities

1. Full time operation 7 days a week in season: N.
2. Establishment to have all necessary trading licenses / Permissions: N.
3. Establishment to have public liability insurance: D.
4. 24hr. lifts for buildings higher than ground plus two floors: N.
5. Bathrooms, Bedrooms, Public areas and kitchen fully serviced daily: N.
6. All floor surfaces clean and in good shape: N.
7. Minimum 10 lettable rooms, all with outside windows/ventilation: N.
8. Minimum size of bedroom (excluding bathroom): 200 sq. ft..

9. Air conditioning: 100% of rooms.
10. A clean change of bed and bath linen daily and between check-in: N.
11. Minimum bed width: 90 cm for single and 180 cm for double.
12. Mattress thickness: N, minimum 10 cm.
13. Minimum bedding: 2 sheets, pillow and case, blanket, mattress protector / bed cover.
14. Suite: N, minimum 1 suite with a bedroom and separate sitting area, having one bathroom and one powder room.
15. Hairdryers: N, must be available in the room on a complimentary basis.
16. Safe keeping/in room safe: N, to be provided in the room.
17. Mini bar / Fridge: N.
18. Drinking water: N, minimum two sealed bottles of branded packaged drinking water of minimum 500 ml per person per day on a complimentary basis.
19. Shelves / drawer space: N.
20. Wardrobe with minimum 4 clothes hangers per bedding: N.
21. Sufficient lighting (1 lamp per bed): N.
22. A 5 amp earthed power socket: N.
23. A bedside table and drawer: N.
24. TV Cable: N, except for eco and nature resorts where it's mandatory to have a TV with cable in a common area.
25. A writing surface with sufficient lighting: N.
26. Chairs: N, preferably one per bed.
27. Waste paper basket: N.
28. Opaque curtains or screening at all windows: N, specifically blackout curtains.
29. A mirror at least half length (3 ft.): N.
30. A stationary folder containing stationary: N.
31. A 'do not disturb' notice: N.
32. Night spread/bed cover: N.
33. Energy saving lighting: N.
34. Linen Room: N.

Bathroom, Public Area & Guest Services

1. Number of rooms with attached bathrooms: All.
2. Minimum size of bathroom: 45 sq. ft..
3. 1 bath towel and 1 hand towel to be provided per guest: N.
4. Bath Mat: N.
5. Guest toiletries: N.
6. Clothes hooks in each bath / shower room: N, two hooks.
7. Sanitary bin: N.
8. Each western WC toilet to have a seat with lid and toilet paper: N.
9. Water sprays or bidets or washlets or other modern water-based post-toilet paper hygiene facilities: N.
10. Floors and walls to have non-porous surfaces: N.
11. Hot and Cold running water available 24 hours: N.

12. Shower cabin: N.
13. Bath tubs: D.
14. Water saving taps and showers: N.
15. Energy saving lighting: N.
16. Lounge or seating area in the lobby: N.
17. Reception facility: N, manned a minimum of 16 hours.
18. Valet (parking) services to be available: N.
19. Availability of Room, F&B and other tariff: N.
20. Heating and cooling in public areas: N.
21. Public rest rooms for ladies and gents: N.
22. At least one room for differently abled guest: N.
23. Ramps with anti-slip floors at the entrance: N.
24. Public Restrooms for differently-abled guests: N.
25. Dry cleaning/laundry: N, for 5-Star Deluxe; D, for 5-Star (may be outsourced).
26. Tea / coffee making facility in the room: N.
27. Iron and Iron Board facility: N, in every lettable room.
28. Paid transportation on call: N.
29. Shoe cleaning shoe horn & slippers: N.
30. Ice (from drinking water) on demand: N.
31. Acceptance of common credit cards and facility/infrastructure for accepting/making payments by digital transactions: N.
32. Assistance with luggage on request: N.
33. A public telephone on premises: N.
34. Wake up call service on request: N.
35. Messages for guests to be recorded and delivered: N.
36. Doctor on call: N.
37. Stamps and mailing facilities: D.
38. Newspapers available: N.
39. Access to travel desk facilities: N.
40. Left luggage facilities: N.
41. Provision for emergency supplies toiletries / first aid kit: N.
42. Health Fitness and Barber's Shop: N.
43. Beauty Salon and Barber's Shop: D.
44. Florist: D.
45. Utility shop/kiosk: D.
46. Money changing facilities: D.

Food & Beverage & Kitchen

1. Food & Beverage Outlets: A 24-hour multi-cuisine restaurant cum coffee shop and one specialty restaurant are necessary for Grade A cities. For other cities, a 24-hour multi-cuisine restaurant is necessary, and a specialty restaurant is desirable.
2. Room Service: 24-hour room service is necessary.
3. Bar: N.
4. Crockery and glassware: N.

5. Cutlery: N, to be at least stainless steel.
6. Refrigerator with deep freezer: N.
7. Segregated storage of meat, fish and vegetables: N.
8. Tiled walls, non-slip floors: N.
9. Colour coded synthetic chopping boards: N.
10. Head covering for production staff: N.
11. Daily germicidal cleaning of floors: N.
12. Good quality cooking vessels / utensils: N.
13. All food grade equipment containers: N.
14. Drinking water (in kitchen): N, treated with UV+ filtration.
15. Ventilation system: N.
16. Garbage to be segregated wet and dry: N.
17. Wet garbage area to be air-conditioned: N.
18. Receiving areas and stores distinct from garbage area: N.
19. Six monthly medical check ups for production staff: N.
20. First aid training for all kitchen staff: N.
21. Pest control: N.

Staff & Safety

1. Staff uniforms for front of the house: N.
2. English speaking front office staff: N.
3. Percentage of Supervisory staff: 80%.
4. Percentage of skilled staff: 60%.
5. Staff Rest Rooms: N.
6. Staff locker Rooms: N.
7. Toilet facilities: N.
8. Separate Dining area & Facility: N.
9. Metal detectors (door frame or hand held): N.
10. CCTV at strategic location: N.
11. X-Ray Machine: N.
12. Under belly scanners to screen vehicles: N.
13. Verification (of staff and suppliers): N.
14. Staff trained in firefighting Drill: N.
15. Security arrangements for all hotels entrances: N.
16. Each bedroom door to be fitted with lock and key, viewport / peephole & internal securing device: N.
17. Smoke Detectors: N.
18. Fire and Emergency alarms should have visual & audible signals: N.
19. First aid kit with over-the-counter medicines at the front desk: N.
20. Fire Exit Signs on guest floors with emergency / backup power: N.
21. Eco-Friendly Practices
22. Sewage Treatment Plant: N.
23. Rain Water Harvesting: N.
24. Waste management: N.

25. Pollution control methods for air, water and light: N.
26. Introduction of non-CFC equipment for refrigeration and air conditioning and other Eco-friendly measures / initiatives: N.

2.5 CENTRAL BYE LAWS

2.5.1 Urban and regional development plans formulation AND IMPLEMENTATION guidelines (URDPFI)

Means of access

For plot development of uses other than residential, the following minimum width corresponding to the length of the means of access shall be followed:

Sr. No.	Width of Means of Access (m)	Length of Means of Access (m)	Other Controls
1.	12.0	200	➢ The width of the means of access shall not be less than the internal access ways in layouts and subdivision.
2.	15.0	400	
3.	18.0	600	
4.	24.0	above 600	

Source: NBC, 2005.

Figure 7Means of Access (NBC, 2005)

For high rise buildings and buildings other than residential, the following additional provisions shall be ensured:

I. The width of the abutting main street shall not be less than 12 m and one end of this street shall join another street not less than 12 m in width.
II. The approach to the building and open spaces on all sides up to 6 m width and the layout shall be done in consultation with Chief Fire Officer of the city.
III. The main entrance to the plot shall be of minimum 6 m width to allow easy access to fire engine.

Parking

2	Commercial Centres		
	Convenience Shopping Centre/Local Shopping Centre / Local Level Commercial areas	2 ECS / 100 sqm of floor area	For Population between 2- 10 lakh – 1 car parking space for every 4 guest room.
	Service Market	2 ECS / 100 sqm of floor area	
	Community Centre / Non- hierarchical Commercial Centre	3 ECS / 100 sqm of floor area	For Population between 10-50 lakh – 1 car parking space for every 3 guest room.
	District Centre/ Sub-Central Business District/Sub-City Level Commercial areas	3 ECS / 100 sqm of floor area	
	Commercial Plot: Retail & Commerce Metropolitan City Centre	3 ECS / 100 sqm of floor area	For Population more than 50 lakh – 1 car parking space for every 2 guest room[143].
	Hotel	3 ECS / 100 sqm of floor area	

Figure 8 ECS requirements

Minimum setbacks

Setbacks based on Plot Sizes :The following table may be referred for deciding the minimum setbacks for different size plots in various use zones. The size of plots should be

Sr. No.	Plot Size (in sqm)	Front (m)	Rear (m)		Side (m)	Side (m)
			Plains	Hill Towns	Plains	Hill Towns
1.	Upto 60	0	0	2	0	1.5
2.	Above 60 and upto 150	3	0	2	0	1.5
3.	Above 150 & upto 300	3	3	3	0	1.5
4.	Above 300 & upto 500	3	3	3	3	3
5.	Above 500 & upto 1000	6	3	3	3	3
6.	Above 1000 & upto 2000	9	3	3	3	3
7.	Above 2000 & upto 4000	9	6	6	6	6
8.	Above 4000 & upto 10000	9	6	6	6	6
9.	Above 10000	15	9	9	9	9

Source: UDPFI Guidelines 1996.

decided after taking into account the provisions of National Housing Policy and Urban Land (Ceiling and regulation) Act. The setbacks, if necessary

Figure 9 Minimum setbacks

Setbacks with respect to abutting road width

Front Setback

Sr. No.	Front Setback (m)	Width of street fronting the plot (m)	Remarks
1.	1.5	Upto 7.5	For buildings upto a maximum height of 7 m
2.	3.0	7.5 to 18	
3.	4.5	18 to 30	
4.	6.0	Above 30	

Figure 10 Front setback w.r.t. abutting road width

***Note**: For streets less than 7.5 m in width, the distance of the building (building line) shall be at least 5m from the centre line of the street.*

Rear and Side setback for building heights above 10m

Sr. No.	Height of Buildings (m)	Side and rear setbacks (m)	Other Controls
1.	10	3	➢ For buildings above 24 m in height, the minimum front setback shall be 6 m. ➢ Where rooms do not derive light and ventilation from the exterior open space, the width of such space shall be reduced by 1 m subject to a minimum of 3 m and maximum of 8m. ➢ Alternative setbacks for tower like structures ○ Upto height of 24 m with one setback: Minimum 6m ○ Between 24 m and 37.5 m with one setback: Minimum 9 m ○ Above 37.5 m with two setbacks: Minimum 12 m
2.	15	5	
3.	18	6	
4.	21	7	
5.	24	8	
6.	27	9	
7.	30	10	
8.	35	11	
9.	40	12	
10.	45	13	
11.	50	14	
12.	55 and above	16	

Figure 11Side & Rare setback w.r.t. abutting road width

The open areas provided in the buildings can be used for the following permissible activities:

Garden, rockery, water well and well structures, plant nursery, water pool, swimming pool (if un covered), platform around a tree, landscaping, tank, fountain, bench, *chabutra* with open to pandunen closed on sides by walls and the like.

Drainage culvert, conduit, catch pit, gully pit, chamber, gutter and the like.

Compound wall, gate, un-storied porch and portico, canopy, slide, swing, uncovered staircase, ramps are as covered by *chajja* and the like.

GroUND COVERAGE & FAR

Sr. No.	Hierarchy of Commercial Centre	Maximum Ground Coverage (%)		Maximum FAR		Maximum Height (m)		Other Controls
		Plains	Hills	Plains	Hills	Plains	Hills	
1.	Cluster Centre Convenience Shopping	40	40	60	60	15	6	
2.	Neighbourhood Centre	30	35	100	100	15	9	
3.	Community Centre	25	30	100	100	26	15	
4.	District Centre	25	25	125	125	37	15	Some of the buildings in Plains could be permitted upto 50 m height with the approval of the Government for achieving an urban form.
5.	Sub city centre	--	--	--	--	--	--	Controls to be as per requirement
6.	City Centre	25 (MPD, pg 59)	--	150 (MPD, pg 59)	--	--	--	Other controls to be as per requirement
7.	Hotel	40 (MPD, pg 59)	--	225	--	--	--	Other controls to be as per requirement
8.	Service Apartment	30	--	150	--	--	--	Other controls to be as per requirement
9.	Any other commercial centre	25%	--	100	--	--	--	Other controls to be as per requirement

Source: UDPFI Guidelines 1996, MPD.

Figure 12 Ground Coverage & FAR

WATER SUPPLY

The CPHEEO Manual recommends fire-fighting water demand as a function of population, i.e. water demand for fire-fighting purpose = $100\sqrt{P}$, where P stands for forecasted population may be adopted for communities larger than 50,000. It is desirable that one-third of fire-fighting requirements from part of the service storage. The balance requirement may be distributed in several static tanks at strategic points. These static tanks may be filled from nearby ponds, streams or canals by water tankers wherever feasible. The pressure required for fire-fighting would have to be boosted by fire engines.

S. No.	Institutions	Litres per head per day
1	Hospital (including laundry) a. no of beds exceeding 100 b. no. of beds not exceeding 100	a. 450 (per bed) b. 340 (per bed)
2	Hotels	180 (per bed)
3	Hostels	135
4	Nurses homes and medical quarters	135
5	Boarding schools/colleges	135
6	Restaurants	70 (per seat)
7	Airport and seaports	70
8	Junction stations and intermediate station where mail or express stoppage (both railway and bus stations) is provided	70
9	Terminal stations	45
10	Intermediate stations (excluding mail and express stops)	45 (could be reduced to 25 where bathing facilities are not provided)
11	Day Schools/colleges	45
12	Offices	45
13	Factories	45(could be reduced to 30 where no bathing rooms are required to be provided)
14	Cinema, concert halls and theatres	15

Source: CPHEEO Manual, 1999.

Figure 13 Water supply requirement in LCD

FIRE FIGHTING

The CPHEEO Manual recommends fire-fighting water demand as a function of population, ie. water demand for fire-fighting purpose = $100\sqrt{P}$, where P stands for forecasted population may be adopted for communities larger than 50,000. It is desirable that one-third of fire-fighting requirements from part of the service storage. The balance requirement may be distributed in several static tanks at strategic points. These static tanks may be filled from nearby ponds, streams or canals by water tankers wherever feasible. The pressure required for fire-fighting would have to be boosted by fire engines

SOLID WASTE MANAGEMENT

Municipal Solid Waste (MSW) is the trash or garbage that is discarded day to day ina human settlement. According to MSW Rules 2000 MSW includes commercial and

residential wastes generated in a municipal or notified areas in either solid or semisolid form excluding industrial hazardous wastes but including treated bio-medical wastes. Waste generation encompasses activities in which materials are identified as no longer being of value (being in the present form) and are either thrown away or gathered together for disposal. The following table indicates the waste generation per capita per day for estimation and forecast of waste generation for future for planning purposes:

S.No.	Land use type	Estimated waste generation
1	Residential refuse	0.3 to 0.6 kg/cap/day
2	Commercial refuse	0.1 to 0.2 kg/cap/day
3	Street sweepings	0.05 to 0.2 kg/cap/day
4	Institutional refuse	0.05 to 0.2 kg/cap/day

Source: Manual on Solid Waste Management, CPHEEO – 2000

Figure 14 Waste generation

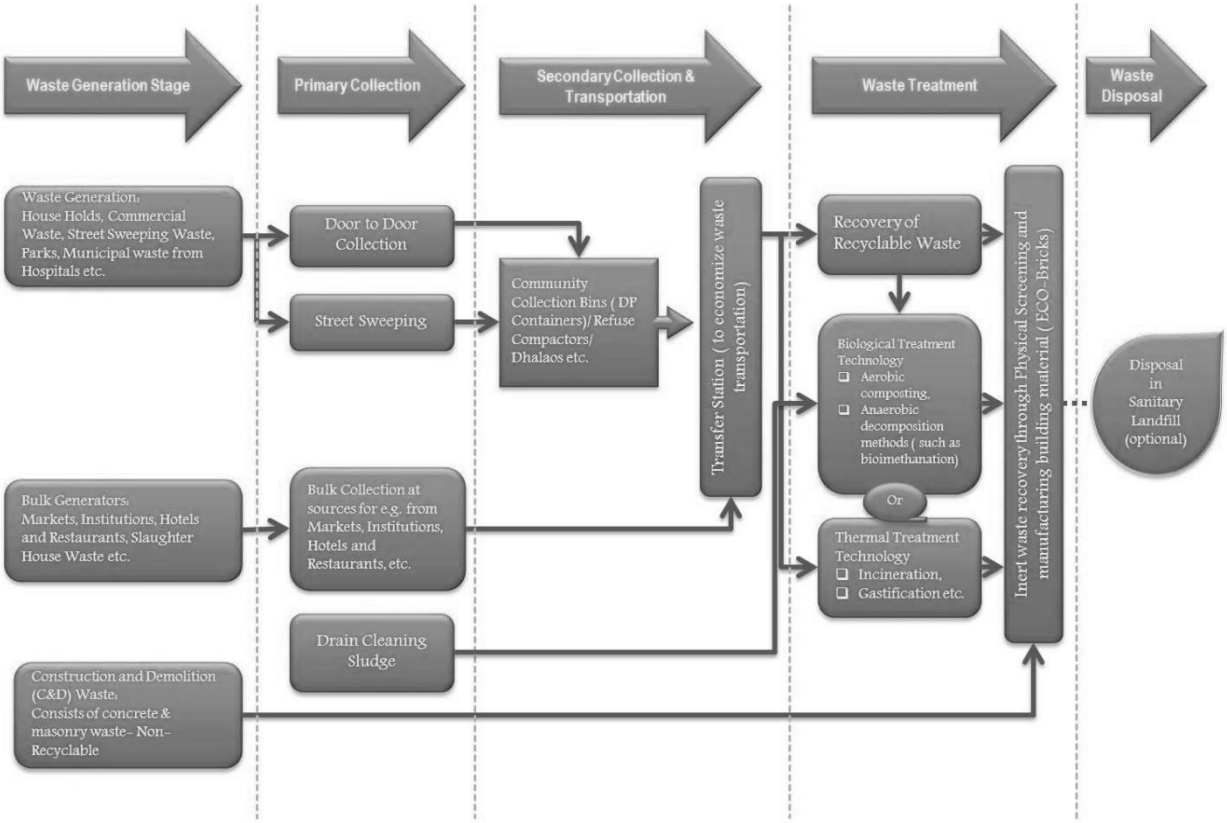


Figure 15 Flow diagram of waste disposal

2.6 NEUFERT ARCHITECTS' DATA FOR HOTELS AND RESTAURANTS

BUILDING

In addition to the recommendations in the code the building in which food service establishment is located shall also conform to the local building byelaws in force. The building should be of a permanent nature and maintained in a proper state of repair and cleanliness.

Table 29 Basic terminology of spaces from Neufert's

Area/Function	Description
Hotel lobby & reception	Central, prestigious hub linking various parts of the operation. Serves as the well-arranged main nerve center.
Catering area	Located near the hotel lobby. The extent of services offered depends on hotel category.
Administration	Staff area, separately accessed but sometimes connected to other hotel areas.
Guest room area	Contains differentiated rooms and individual access areas; arrangement considers category, orientation, and noise screening.
Service area	Includes kitchens, store, and associated rooms.

vertical zoning

Block:

The "Block" form consists of a simple, rectangular block structure. Hotel rooms are arranged

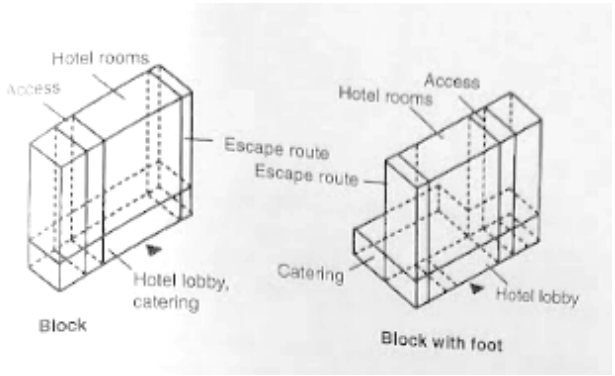


Figure 16 form 1&2

along access corridors, with escape routes, a hotel lobby, and catering facilities typically located at the base of the building.

Block with foot:

Similar to the block form, the “Block with foot” adds an extension or ‘foot,’ often used for the hotel lobby or catering area, providing more flexibility in the arrangement of service spaces.

Corner block:

The “Corner block” is an L-shaped structure, where hotel rooms are arranged along two wings. This layout offers distinctive access and escape routes, with the catering and lobby

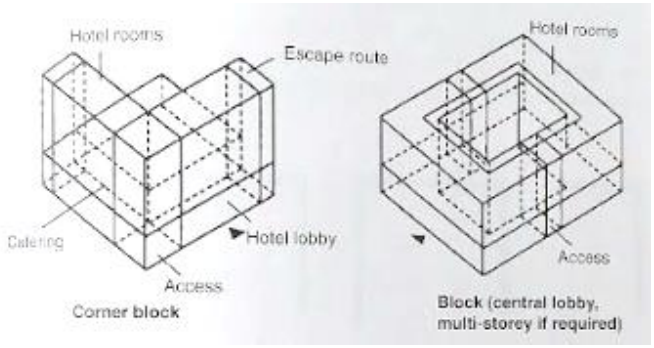


Figure 17 form 3&4

areas positioned conveniently at the intersection.

Block (central lobby, multi-storey if required):

This form features a central lobby, often extending vertically to multiple storeys if needed. Hotel rooms surround this central space and access and escape routes are directly connected to the core.

Solitary (central lobby):

The “Solitary (central lobby)” form typically features a round or standalone building, with a central lobby and hotel rooms arranged in a ring or radial fashion around it, ensuring direct access.

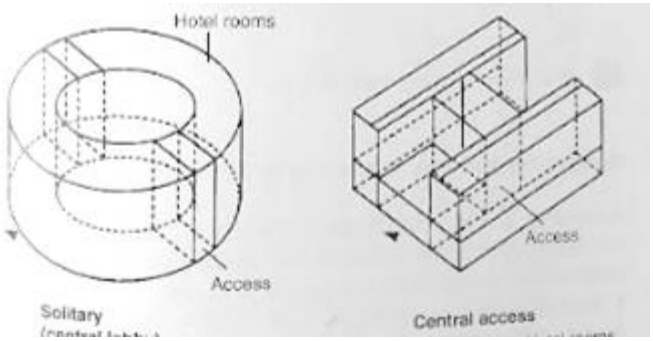


Figure 18 form 5&6

Central access:

In the “Central access” form, a central corridor or lobby gives access to hotel rooms on either side, with escape routes and service areas efficiently organized off the main axis.

Star:

The “Star” configuration has hotel rooms extending outwards in branch-like arms from a

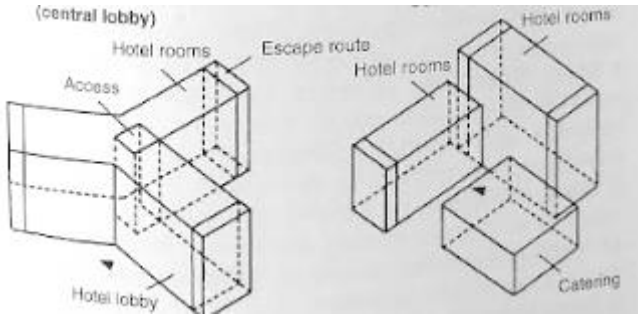


Figure 19 form 7&8

central hotel lobby, offering direct access and flexibility in room arrangement.

Ensemble:

The “Ensemble” form combines several blocks or wings into a larger, cohesive hotel complex, allowing for varied arrangements and larger capacities, suited to diverse site and operational needs.

Horizontal zoining

The scheme below the tables visually represents the typical horizontal zoning layout, showing how different hotel functions are organized:

1. Public and common areas (like Reception/Lobby) are placed centrally for easy access.
2. Guest rooms are set on both sides, making corridors efficient.
3. Catering (Restaurant/Bar/Kitchen) is close to the Lobby.
4. Event spaces (Ballroom, Seminar rooms) are also central or adjacent to public areas.
5. Service and staff rooms are located away from guest circulation but connected for efficient operations.
6. Deliveries, Stores, Laundry, and Services are grouped and separated from guest flow.
7. Recreation (Swimming pool, Sport area) is on the periphery or in areas with special access.
8. Vehicle access (parking/garage) is shown with direct/controlled access.

Purpose: Ensures that public, semi-public, and private zones are clearly separated, improving functionality, guest experience, and operational efficiency.

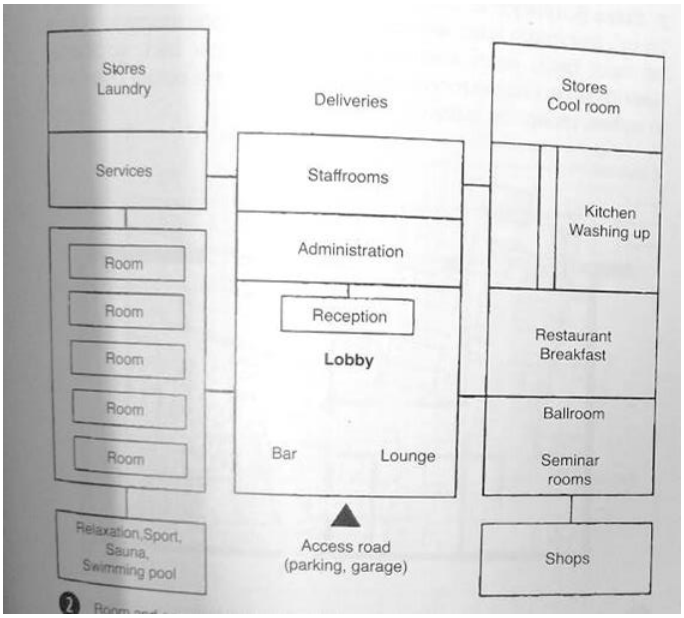
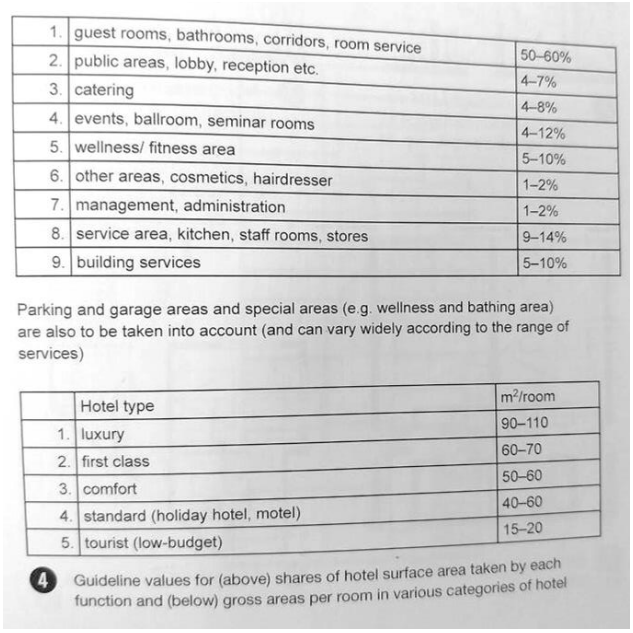


Figure 20 Horizontal zoning

FLOORS

The floors of all rooms in which food or drink is stored, prepared or served and of all washing placed shall be of such construction as to be impervious, easily cleansed, smooth and in good repair. All floors shall be kept clean and free from litter. Dustless method of floor cleaning shall be used, ail except emergency floor cleaning shall be done during the



1.	guest rooms, bathrooms, corridors, room service	50–60%
2.	public areas, lobby, reception etc.	4–7%
3.	catering	4–8%
4.	events, ballroom, seminar rooms	4–12%
5.	wellness/ fitness area	5–10%
6.	other areas, cosmetics, hairdresser	1–2%
7.	management, administration	1–2%
8.	service area, kitchen, staff rooms, stores	9–14%
9.	building services	5–10%

Parking and garage areas and special areas (e.g. wellness and bathing area) are also to be taken into account (and can vary widely according to the range of services)

	Hotel type	m²/room
1.	luxury	90–110
2.	first class	60–70
3.	comfort	50–60
4.	standard (holiday hotel, motel)	40–60
5.	tourist (low-budget)	15–20

4 Guideline values for (above) shares of hotel surface area taken by each function and (below) gross areas per room in various categories of hotel

Figure 21 Internal area statement

period when least amount of food and drink is exposed.

WALLS

The walls shall have a smooth, non-absorbent surface, free from cracks and crevices to facilitate their efficient cleaning.

The walls of all rooms in which food or drink is prepared or utensils are washed shall have a smooth washable surface up to a minimum height of 2-O m from the floor.

CEILING

Ceiling shall be clean, leak-proof and have a smooth non-absorbent surface free from cracks and crevices to facilitate their efficient cleaning. These should be such that they do not harbour vermin.

DOOR AND WINDOWS

In the absence of air-conditioning all openings to the outer air including doors, windows, sky lights shall be effectively screened with tight fitting screens free from holes with wire gauge conforming to IS: 1568-

1960*. The doors when not in use shall be kept in closed position. Self closing screened doors to the outer air shall open outwards. Other methods approved by the authority shall be employed to ensure the absence of flies

LIGHTING

TABLE 1 RECOMMENDED VALUES OF ILLUMINATION

The lighting of some of these locations will be determined primarily by aesthetic considerations and the recommended illumination values as given in IS : 3646 (Part II)-1966* may be taken as a guide only.

Sl No.	Areas	Illumination, Lux
(1)	(2)	(3)
i)	Entrance halls	150
ii)	Reception and accounts	300
iii)	Dining rooms (tables)	100
iv)	Lounges	150
v)	Bedrooms:	
	a) General	100
	b) Dressing tables, bed heads, etc	200
vi)	Writing rooms (tables)	300
vii)	Corridors	70
viii)	Stairs	100
ix)	Laundries	200
x)	Kitchens	†200
xi)	Goods and passenger lifts	70
xii)	Clockrooms and toilets	†200
xiii)	Dining rooms:	
	a) Tables	100
	b) Cash desks	300
xiv)	Self service-counters	300

*Code of practice for interior illumination: Part II Schedule for values of illumination and glare index.

†Supplementary local lighting should be provided over kitchen equipment and mirrors.

Figure 22 Recommended values of illumination – IS Codes

VENTILATION

In case of ran-air-conditioned buildings the minimum standards of mechanical ventilation shall be maintained as given

TABLE 2 VENTILATION REQUIREMENTS FOR NON-AIRCONDITIONED BUILDINGS

Sl No.	Area	Air Changes per Hour
(1)	(2)	(3)
i)	Living rooms	3
ii)	Dining and lounge	2-3
iii)	Big kitchen	12
iv)	Small kitchen	6
v)	Toilets	6

Figure 23 Ventilation Requirements - IS Codes

WATERSUPPLY

There shall be adequate supply of safe and potable water. Running water shall be easily accessible to all rooms in which food is prepared or utensils

TABLE 3 WATER SUPPLY REQUIREMENTS FOR HOTELS AND RESTAURANTS

Sl No.	Description	Non-Airconditioned (Litres per Day)	Air Conditioned (Litres per Day)
(1)	(2)	(3)	(4)
i)	Hotels (per bed)	180	275
ii)	Restaurants (per seat)	70	97

Note — In hotels where laundry is provided arrangement for an extra quantity of 120 litres per bed should be made.

are washed. Requirements for water supply for hotels and restaurants shall be as given

Figure 24 Water requirement in hotel

STORAGE OF WATER

For the storage of water, proper receptacles made of galvanized iron or other suitable material shall be used. Such receptacles shall he kept covered with tight fitting lids and shall have screw caps at the bottom for draining out residual water. The receptacles shall be placed on a stand or a platform rasily accessible for the purpose of maintenance and cleaning, The receptacles shall be examined and cleaned regularly.

DRAINAGE

Adequate arrangements shall be made for satisfactory drainage of all sewage and waste water. Harmful waste water, such as water containing kitchen waste, &all be saticfactorily disposed of. The drainage shall be so designed as to cause no stagnation at

the maximum discharge rate fur which the different units are designed. The requirements for firments for drainage and sanitation shall conform to the requirements given

TABLE 4 REQUIREMENTS OF DRAINAGE AND SANITATION FITMENTS IN HOTELS

(*Clause* 14.1.1)

Sl No.	Fitments	For Residential Public and Staff	For Public Rooms		For Non-Residential Staff	
			For Males	For Females	For Males	For Females
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Water-closets	1 per 8 persons omitting occupants of the room with attached water-closets; minimum of 2 if both sexes are lodged	1 per 100 persons up to 400 persons; and for over 400, add at the rate of 1 per 250 persons or part thereof	2 per 100 persons up to 200 persons; and for over 200, add at the rate of 1 per 100 persons or part thereof	1 for 1-15 persons 2 for 16-35 persons 3 for 36-65 persons 4 for 66-100 persons	1 for 1-12 persons 2 for 13-25 persons 3 for 26-40 persons 4 for 41-57 persons 5 for 58-77 persons 6 for 78-100 persons
ii)	Ablution taps	1 in each water-closet	1 in each water-closet	1 in each water-closet	1 in each water-closet	1 in each water-closet
		1 water tap with draining arrangements shall be provided for every 50 persons or part thereof in the vicinity of water-closets and urinals				
iii)	Urinals	—	1 per 50 persons or part thereof	—	Nil up to 6 persons 1 for 7-20 persons 2 for 21-45 persons 3 for 46-70 persons 4 for 71-100 persons	—
iv)	Wash basins	1 per 10 persons omitting the wash basins installed in the room suite	1 per water-closet and urinal provided	1 per water-closet provided	1 for 1-15 persons 2 for 16-35 persons 3 for 36-65 persons 4 for 66-100 persons	1 for 1-12 persons 2 for 13-25 persons 3 for 26-40 persons 4 for 41-57 persons 5 for 58-77 persons 6 for 78-100 persons
v)	Baths	1 per 10 persons omitting occupants of the room with bath *en suite*	—	—	—	—
vi)	Slop sinks	1 per 30 bedrooms, minimum 1 per floor	—	—	—	—
vii)	Kitchen sinks and dish washers	← 1 in each kitchen →				

Note 1 — Some of the water closets may be of European style if desired.

Note 2 — It may be assumed that two-thirds of the number are males and one-third females.

Figure 25 Drainage & Sanitation fitments in hotels- IS Codes

Figure 26 Drainage & Sanitation fitments in Restaurants- IS Codes

Sl No.	Fitments	For Male Public	For Female Public	For Male Staff	For Female Staff
(1)	(2)	(3)	(4)	(5)	(6)
i)	Water-closets	1 for 50 seats up to 200 seats; and for over 200 seats, add at the rate of 1 per 100 seats or part thereof	1 for 50 seats up to 200 seats; and for over 200 seats, add at the rate of 1 per 100 seats or part thereof	1 for 1-15 persons 2 for 16-35 persons 3 for 36-65 persons 4 for 66-100 persons	1 for 1-12 persons 2 for 13-25 persons 3 for 26-40 persons 4 for 41-57 persons 5 for 58-77 persons 6 for 78-100 persons
ii)	Ablution taps	1 in each water-closet	1 in each water-closet	1 in each water-closet	1 in each water-closet
		1 water tap with draining arrangements shall be provided for every 50 persons or part thereof in the vicinity of water-closets and urinals.			
iii)	Urinals	1 per 50 seats	—	Nil up to 6 persons 1 for 7-20 persons 2 for 21-45 persons 3 for 46-70 persons 4 for 71-100 persons	—
iv)	Wash basins	1 for every water-closet provided			
v)	Kitchen sinks and dish washers	1 in each kitchen			
vi)	Slop or service sinks	1 in the restaurant			

Note 1 — Some of the water closets may be of European style, if desired.

Note 2 — It may be assumed that two-thirds of the number are males and one-third females.

Septic tanks conforming to IS: 2470 (Part I)- 1963* or IS: 2470 (Part II)-l964 shall be provided if required by the authority. The gradient of the drains should be such that no water stagnates anywhere within the premises. Where no sewerage is provided for the final outfall, soak pits or access pools to the satisfaction of the Authority should be provided

KITCHEN

Kitchen shalt be sufficiently spacious and should be of a size in proportion to the average number of diners catered for at one meal, The floor spice in the kitchen shall be calculated at the rate of0.5 me Min per diner. In case of snack bars, soda fountains, etc, the service-cum dispensing area shall be treated as part of the kitchen.

The minimum size of the kitchen should not be less than 10 rnp and none of the sides less than 2.4 meter. Exhaust fans should have provisions of grease filters for collecting grease

STORAGE AND HANDLING EQUIPMENT

All containers and utensils shall be stored at a height of not less than. 430 mm above the floor in a clean, dry place protected from flies, splash, dust, overhead leakage, and other contamination

STORAGE OF FOOD STUFF

All perishable food shall be stored at the temperatures

as given in

Sl No.	Names of Articles	Storage Temperature °C
(1)	(2)	(3)
i)	Meat, meat products, poultry	0·00 to 1·50
ii)	Fresh fish and sea food	−2·00 ,, −0·50
iii)	Dairy products and eggs	0·50 ,, 2·50
iv)	Fresh fruit and vegetables	2·00 ,, 4·50
v)	Ice-creams	−14·50 ,, −12·00

Note 1 — Potatoes need no refrigeration, but should be stored away from light.

Note 2 — Fish and sea foods shall be stored in separate compartments so as not to affect other materials.

Figure 27 Storage temperatures for food

ACOUSTICS

Food service establishments (hotels, restaurants, etc) shall adopt suitable noise control measures to provide adequate sound insulation against various noise sources which would cause disturbance to human comfort and efficiency

FIRE SAFETY REQUIREMENTS

All buildings and particularly buildings having more than one storey shall be provided with liberally demiglace safe-fire-resistant exists or escapes.

The exits shall be so placed that they are always immediately accessible and each is

capable of taking all the persons on that floor as alternative escape routes may be

rendered unsuitable and/or unsafe due to fire.

Escape route shall be well-ventilated as persons using the escapes are likely to be overcome by smoke and/or fumes which may enter from floor.

Basements- It is essential that the fire resistance of the basement conforms to the highest order and all columns for separating the upper structure shall have grading not less than the standards laid down for Grade 3.

Grade No.	Time in Hours, Minimum Resistance Against Standard Fire	Fire Load and Class of Fire Which Structural Element may Withstand	
		Fire Load in kcal/cm²	Class of Fire
(1)	(2)	(3)	(4)
1	6	1 100 000 and over	Very high
2	4	550 000 to 1 100 000	High
3	2	275 000 to 550 000	Medium
4	1	less than 275 000	Low
5	½	—	Very low

Figure 28 Classification of structural components – IS Codes

2.7 CRZ 2019

The CRZ Notification under the Environment Act, 1986, regulates coastal activities to protect ecosystems, traditional livelihoods, and promote sustainable development. It is vital for Andhra Pradesh, with its 974 km coastline, balancing growth with environmental and climate resilience.

Table 30 CRZ 2019 category

CRZ Category	**Definition/Characteristics (2019 Notification)**	**No Development Zone (NDZ) / Setback**	**General Permissible Activities**	**General Prohibited Activities**	**Clearance Authority**
CRZ-I	Ecologically most sensitive areas and geomorphological features vital for coastal integrity.	N/A (highly restricted zone)	Limited eco-tourism (mangrove walks, nature trails); Exploration of natural gas; Salt extraction. Certain small infrastructure projects	Setting up new industries; Expansion of existing industries; Manufacture/handling of oil/hazardous substances; New fish processing units; Land reclamation (except	MoEF&CC / Central Government (based on CZMA recommendation), with specific exceptions for CZMA.

			(jetties, temporary structures, erosion control) by CZMA.	permissible activities with prior permission); Untreated waste/effluent discharge; Solid waste dumping.	
CRZ-IA	Mangroves (with 50m buffer if >1000 sq. mts), Corals/coral reefs, Sand dunes, Biologically active mudflats, Salt marshes, Turtle nesting grounds, Horseshoe crab habitats, Seagrass beds.	N/A	As above.	As above.	As above.
CRZ-IB	Intertidal zone (area between Low Tide Line and High Tide Line).	N/A	As above.	As above.	As above.
CRZ-II	Developed land areas up to or close to the shoreline, within existing municipal limits or other legally designated urban areas, substantially built-up (>50% built-up plots) with drainage and roads.	N/A (construction allowed on landward side of existing structures)	Construction for residential, schools, hospitals, public places on landward side of existing structures/roads. Current FSI/FAR norms permitted.	Unauthorized structures.	State CZMA

CRZ-III	Relatively undisturbed areas not falling under CRZ-I or CRZ-II; includes rural and urban areas not substantially built up.	Varies by sub-category	Agriculture-related activities; Limited public facilities. Beyond NDZ: beach resorts and tourism development (subject to guidelines). Allowances for traditional communities' dwelling units and fishing facilities (2011 provisions, subject to 2019 review).	No construction in NDZ except repairs/reconstruction of existing authorized structures (without exceeding FSI/plinth area).	State CZMA
CRZ-IIIA	Densely populated rural areas (population density > 2161 per sq km as per 2011 Census).	50 meters from HTL (No Development Zone)	As above.	As above.	As above.
CRZ-IIIB	Less populated rural areas (population density < 2161 per sq km as per 2011 Census).	200 meters from HTL (No Development Zone)	As above.	As above.	As above.

CRZ-IV	Water areas.	N/A	Fishing and allied activities; Regulation of pollution from oil/gas exploration, mining, boat houses, shipping.	Disposal of untreated sewage, effluents, ballast water, ship washes, fly ash, solid waste from all activities (including aquaculture).	MoEF&CC / Central Government (based on CZMA recommendation), with specific exceptions for CZMA.
CRZ-IVA	Water area and seabed from LTL to 12 nautical miles seaward.	N/A	As above.	As above.	As above.
CRZ-IVB	Water area and bed area of tidal-influenced water bodies from mouth of water body at sea up to influence of tide (salinity of 5 ppt during driest season).	N/A	As above.	As above.	As above.

CRZ-II (Developed Land Areas)

CRZ-II areas are characterized as developed land areas that are situated up to or in close proximity to the shoreline. These areas typically fall within existing municipal limits or other legally designated urban areas, are substantially built-up (defined as having a ratio of built-up plots to total plots exceeding 50%), and are already provided with essential urban infrastructure such as drainage and roads.[2]

Construction activities are generally permitted in CRZ-II, specifically on the landward side of existing authorized roads or fixed structures.[5] This includes construction for residential purposes, schools, hospitals, and various public facilities.[5] A significant change introduced by the CRZ Notification 2019 is the permission to apply the current Floor Space Index (FSI) or



Figure 29Grid 118 CRZP

Floor Area Ratio (FAR) norms prevailing in urban areas, thereby removing the stricter restrictions on construction size that dated back to the Development Control Rules of 1991.

Coastal Zone Management Plans (CZMPs)

Coastal Zone Management Plans (CZMPs) are essential for implementing CRZ rules. They map CRZ categories, fishing villages, and community infrastructure through consultative processes, serving as the official reference for coastal boundaries and regulatory classifications in any area. Our site lies in the Grid 118 of CRZ.

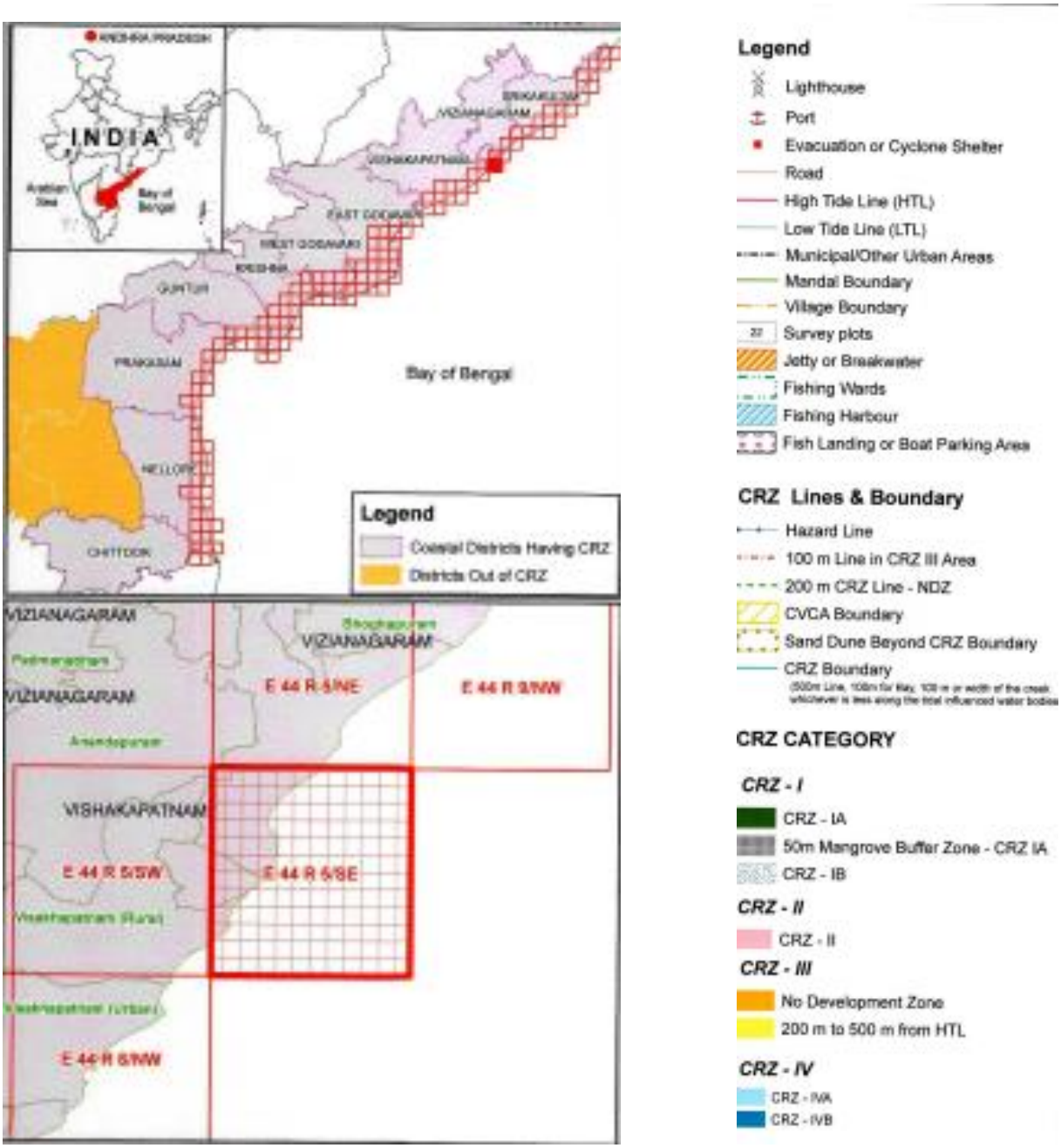


Figure 30 CZMPS

2.8 SUMMARY FROM TIME STANDARDS

Table 31 TSS1

Category	**Explanation**
Circulation Planning (Front vs Back of House)	A fundamental planning principle in hotel design is the clear separation of guest and service circulation. The front-of-house areas (like lobbies, restaurants, and guest rooms) must never intersect with the back-of-house functions (such as kitchens, storage, and staff circulation). However, both must remain efficiently interconnected to support smooth operations without disrupting the guest experience.
Guest Comfort & Environmental Quality	The physical environment significantly influences guest satisfaction. Factors such as appropriate lighting, color schemes, comfortable furnishings, pleasant air temperature, and overall ambiance are essential in shaping a relaxed and inviting atmosphere. Design must prioritize the sensory and emotional comfort of guests, aligning aesthetics with functionality.
Cost and Investment Considerations	Hotel economics revolve around land cost, construction cost, and interior furnishing expenses. These constitute the primary capital investment. Therefore, design decisions must be economically rational, ensuring efficient space utilization and long-term operational viability while staying within budgetary limits.
Back of the House – Importance & Planning Logic	Though hidden from public view, the back-of-the-house is the operational core of the hotel. Efficient planning of these areas ensures logistical control and optimizes service delivery. Functions like storage, food prep, waste management, and staff operations need to be discreet yet accessible, supporting the hotel's daily functions seamlessly.
Receiving and Loading Areas	The receiving dock is a key service node, usually covered to allow all-weather operations. It should be directly linked to the receiving department. Importantly, guests should never witness these service operations, reinforcing the spatial separation between hospitality and logistics.
Material Flow and Control Measures	Two levels of control are emphasized: (1) preventing theft and misplacement of incoming goods through immediate checking, and (2) ensuring that supplies reach their destination directly without unnecessary detours. This requires well-mapped circulation paths, tight security, and thoughtful architectural planning.
Service Circulation Patterns	A controlled, one-directional flow of supplies and staff within the back-of-house enhances security and efficiency. Well-planned

	corridors and nodes, designed with security in mind, help maintain order and reduce operational lag or confusion.
Garbage Management & Waste Flow	For large hotels, garbage destructors or compactors may be integrated into the plan. Where garbage is stored before disposal, rooms must be refrigerated and placed in view of the receiving area to ensure hygiene and oversight. Proper waste circulation also prevents contamination and odour issues.
Staff Entry, Control, and Social Zoning	A single, controlled point of entry and exit for staff enhances security. Staff circulation must be planned to reduce travel time and avoid overlap with guest areas. Additionally, social hierarchy among employees (e.g., waiters vs. dishwashers) is acknowledged through spatial zoning in locker rooms and lounges.
Locker Room Facilities and Work Access	Locker areas must be well-equipped with toilets and showers, supporting hygiene and morale. The plan should ensure minimal travel time from locker to workstation, which contributes to better productivity and staff satisfaction. Clear internal zoning and orientation help streamline daily staff routines.

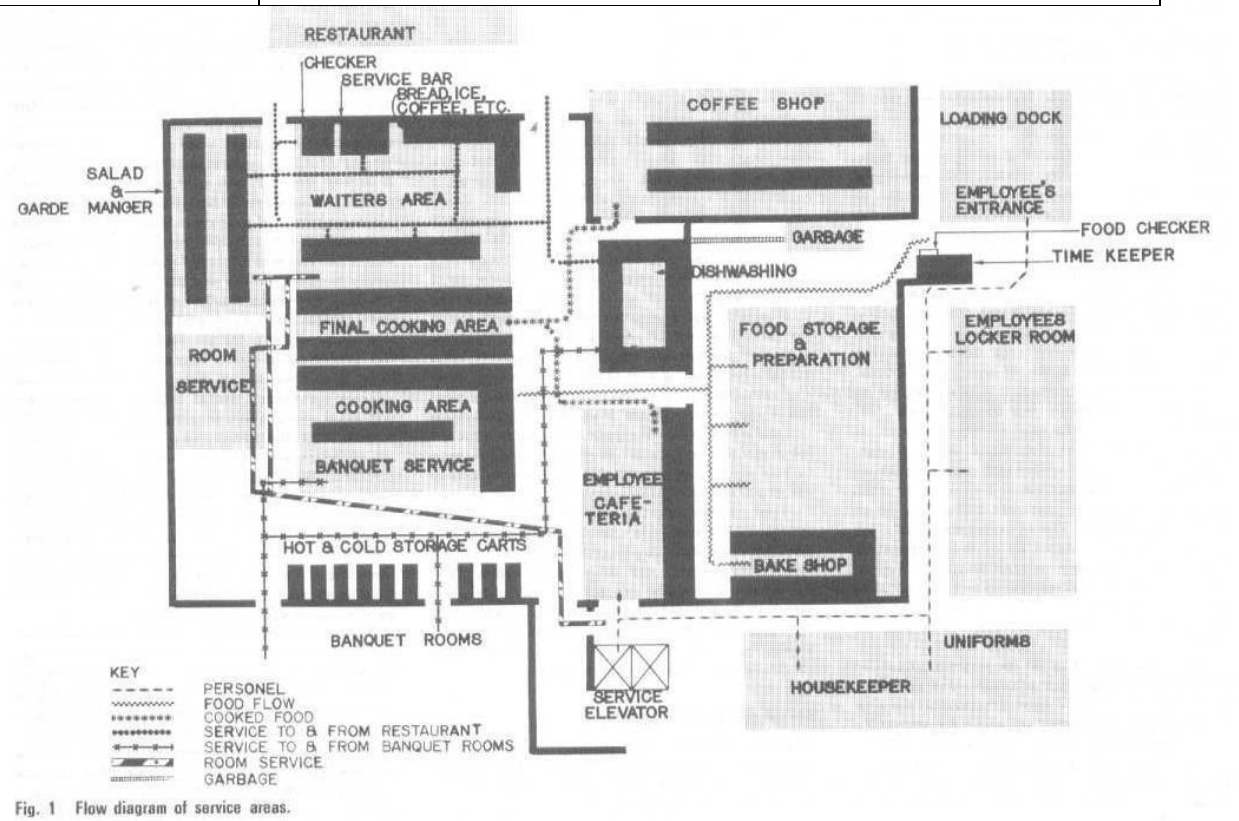


Figure 31Flow Diagram of Service Area (ITC Hotel Manual)

Table 32 TSS2

Department / Function	**Design and Planning Considerations**
Uniform & Linen Circulation	Uniforms are managed by the housekeeper and laundered in-house. Soiled linens move through a vertical linen chute from every typical floor's service room to a central laundry area. Proximity to service elevators ensures efficient vertical circulation. Trash chutes are planned alongside linen chutes to optimize utility space on each floor.
Laundry Facilities	Mid-to-large hotels require extensive space for washing, drying, ironing, and pressing of flatwork (sheets, towels), uniforms, and guest garments. Dry-cleaning and valet services are usually integrated and supervised by a laundry manager. Laundry design must support separation of clean and soiled linens, and accommodate large machines and workflow.
Housekeeping Department	Headed by a chief housekeeper, this department oversees all maids and porters. Housekeeping includes storage areas for supplies (linen, soap, tissue, menus, etc.). Typically, one porter is assigned to each maid, and each maid services a maximum of 15 rooms per day. There are also night maids for turndown service. Locker rooms and optimized circulation are essential.
Food & Beverage Services – Receiving to Kitchen	Food is delivered, weighed, and sorted into storage zones: dry, refrigerated, and frozen. Specific cold storage boxes are required for dairy, fish, meat, vegetables, etc., with proper insulation. Vegetable prep areas must have sinks, cutting boards, and workspace. Theft prevention through spatial placement is critical (e.g., bakery close to kitchen to reduce losses).
Kitchen (Hot and Cold Prep)	The food prep flow starts from vegetable cutting to rough cooking (soups, bulk items) and finishes at line cooking stations (ovens, broilers, fryers). A central chef's aisle runs between cooking and serving counters. Waiters collect food from heated serving tables in a self-service manner. Pot washing is planned near rough cooking to streamline cleanup.

Dining Room Interface	A dishwashing area is placed adjacent to the dining room for easy disposal, but isolated from cooking areas due to noise and hygiene concerns. A checker's desk tracks orders leaving the kitchen. A service bar with a bartender supports beverage service, while a glass-enclosed chef's office offers oversight and menu planning visibility.
Room-Service Area	Located near the garde manger (cold prep) and cooking zones, this area stores rolling tables pre-set for room service delivery. Adequate space must be provided for storage, food plating, and circulation. The location supports rapid dispatch following telephonic orders from guests.

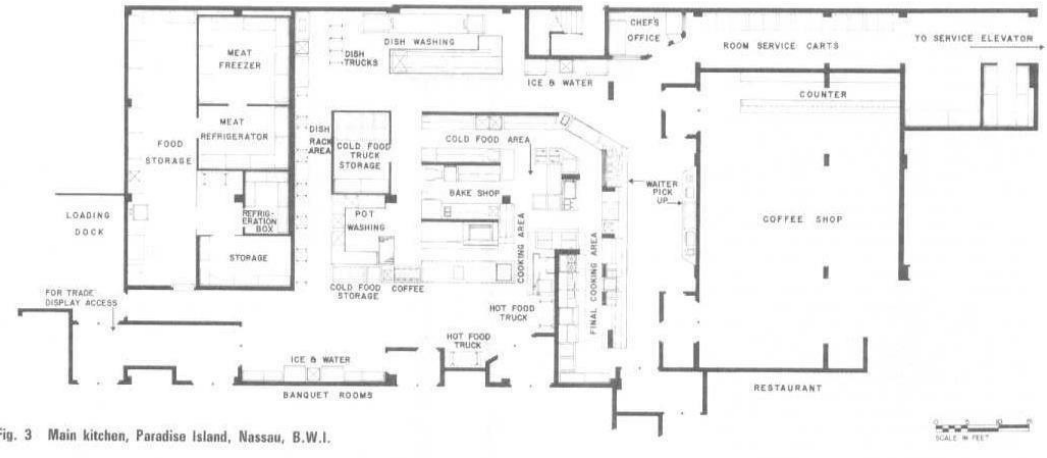


Figure 32 Flow diagram of Service Areas (ITC Hotel Manual)

Table 33 TSS3

Section	**Design & Functional Considerations**
Room Service Area	Should be adjacent to service elevators to minimize delivery time. Adequate space must be allocated for meal carts, access to kitchens, and interface with guest floors.
Cooking Area	Staffed by short-order chefs and garde manger team. Design requires separate sections for different meal types (e.g., breakfast), with quick access from prep to hot zones. Efficient food flow is crucial.
Banquet Facilities	Includes separate banquet kitchen and dishwashing area. Use of heated/cooled mobile cabinets for pre-set trays. Requires significant space planning to handle volume and timed service.
Kitchen Support Facilities	Toilets for kitchen staff should be placed within or adjacent to kitchens to avoid long detours. Dining room doors must be baffled

	for sound and visual privacy. Coffee shops and other dining spaces ideally back up to kitchen for efficient food transfer.
Waiter & Dish Pick-up Zones	Includes pickup counters, plate warmers, and pass-throughs to dishwashing. Designed for minimal interference with diners and efficient reuse cycle.
Employee Cafeteria	Should be near locker rooms and main kitchen, enabling efficient access and food service for staff. Supports morale and operational efficiency.
Beverage Service Areas	Bars and lounges need direct service routes for delivery of liquor, snacks, and supplies, ideally backed by the kitchen with pass-throughs. Seating arrangements depend on local codes.
Mechanical & Engineering Services	The mechanical room houses HVAC, pumps, and electrical gear. Requires adjacent engineer's office and repair shops (carpentry, upholstery, locksmith). Also includes storage rooms for spare parts.
Back-of-House Admin	Includes bookkeeping, reservations, and mail sorting rooms. Strategically placed to back up the front-of-house functions, such as registration and cashier counters, enabling efficient communication and operations.
Front of the House	Encompasses lobbies, dining areas, elevators, guest rooms, and corridors. Designed entirely from the guest's perspective—aesthetic, intuitive circulation, and convenience.
Guest Registration Desk	Located prominently at lobby entrance. Scaled by hotel size—large hotels need multiple clerks. Desk area includes reservation file system, advance registration counter, and access to administrative offices.
Mail & Keys Management	Key rack typically sits behind the front desk for easy access by clerks. Larger hotels may have dedicated key management staff and zones.
Cashier Operations	Typically next to registration, but may be relocated in large hotels to avoid crowding. Includes vault access, guest safe deposit system, and internal coordination with bookkeeping.
Administrative Offices	Varies by hotel scale. Includes manager and assistant manager offices, reception typists, and specialized areas for banquet, convention, or F&B managers. Placement allows oversight without disrupting guest flow.

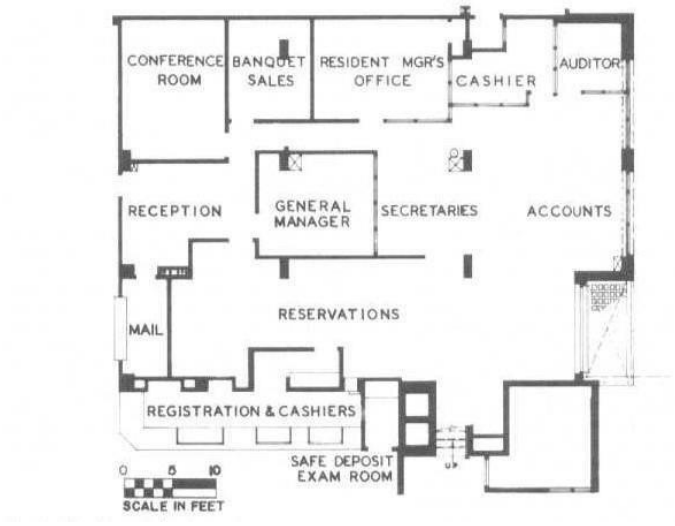


Figure 33 Admin Plan, Churchhill Hotel London

Table 34 TSS4

Space Type	**Design Considerations**	**Planning Norms / Notes**
Lobby	Essential in every hotel type; sets ambiance.	Size depends on number of rooms and hotel type; ambience through furniture, finish, color, lighting.
Elevators	Required for all hotels except 1–2 story motels.	- Should be visible from entrance or reception. - Centrally located on guest floors. - Separate service elevators. - Elevator banks must serve front/back of house efficiently. - Bell captain's station must overlook entry, desk, cashier, elevators. - Include luggage storage near lobby.
Guest Floor Corridors	Avoid guest doors opposite elevators.	- Use foyer with different decor/lighting. - Add seating and full-length mirror near elevator. - Provide ash/trash receptacles. - Ideal corridor length ≤ 100 ft. - Minimum corridor width = 6 ft (some manage with 5 ft). - Recessed doors (1–2 ft) add privacy. - Wall dado or contrasting color to resist damage.

Guestrooms	Room dimensions depend on furniture and luxury level.	- Typical beds: Single (3’6”), Double (4’6”), Queen (5’), King (6’), all ~6’6” length. - Allow 3’ aisle; minimum room width = 10’6”. - Opposite furniture (dresser): ~24” deep. - Seating: Two chairs + cocktail table (~5’ from wall). - Lighting: Ceiling + bedside reading lamps. - Other essentials: Luggage stand, writing chair, nightstand.
Suites	Serve affluent travelers or those entertaining clients/families.	- Studio rooms with dual sleep furniture (day sofas, night beds). - Suites = sitting room + 2–4 bedrooms. - Located at building corners for connectivity. - Rooms within suites should be independently rentable (via foyer/keying). - Each sitting area should have a full bathroom and water-connected bar. - Lower floors preferred for proximity to public/convention spaces.
2.3.16 Guest Bathrooms	Basic bathroom elements include a tub-shower combo, lavatory, and WC.	- Minimum: 5-ft tub, 1 lavatory; ideal: 2 lavatories (in or outside).- Bidet: Only in luxury hotels.- Wall-hung units: Preferred for easy cleaning, but cost-intensive.- Preferred: Telephone-type shower head with dual mounting (hand & high level).- Provide ledge for toiletries with integrated holders (toilet tissue, tumbler, toothbrush).- Electrical outlet mandatory for shavers, toothbrushes; razor blade slot recommended.- Towel bars should be reachable from all fixtures.- Add retractable clothesline (for wash-and-wear).- Provide dual-faced (magnifying & normal) wall mirror.
2.3.17 Guest Closets	Storage and accessibility based on hotel type and length of stay.	- Should accommodate luggage without reducing hanging/shoe/shelf space.- Prefer flat reach-in or walk-in with visible interiors (no blind corners).- Include hang rod (for men’s and women’s clothes), top shelf, and shoe rack.- Open hanging systems help reduce forgotten items.



Figure 34 Guest room details (ITC Hotel Manual)



Figure 35 Guest room details (ITC Hotel Manual)

Table 35 TSS5

Category	**Standard/Guideline**	**Key Notes**
General Space Requirements	Calculate area needs based on: service type, equipment, staff, supplies, and traffic.	Over/under-sized spaces affect cost and efficiency.
Dining Area (per seat)	Banquet: 10 sq ft/seatDeluxe: up to 20 sq ft/seat	Include aisle space, comfort, and table types (booth, square, diagonal).
Service Stations	Small: 1 per 20 seatsCentral: 1 per 50–60 seats	Sizes range from 24"x24"x36" to 10'x2.5'x6' (approx.).
Booth Dimensions	Width (including seats + table): 5.5 ft	Lunch counter: 16–30 in. wide, 20–24 in. per seat
Table Spacing & Aisles	Chairs: Min. 18" passageTables: 4–5 ft apartEmployee aisles: 2.5 ft+	Aisles for carts: size per cart width
Counter Service	1 counter line/250–300 patronsRecommended max: 50 ft	Typical width: 14 ft (patron lane + tray + counter + workers + back bar)
Turnover Rate	No. of seats × turnover/hour = total patrons/hour	Higher turnover = higher efficiency
Banquet Planning	Folding tables: 30" wide × 72" or 96" long	24" per place setting, plan for flexible seating
Dining Efficiency	Diagonal square tables improve flow	Folding partitions/screens help during off-peak times
Kitchen Area	Rule of thumb: ⅓ to ½ of dining area	Depends on meals/hour, food type, equipment, prep complexity, etc.
Kitchen Layout Guidelines	Min. aisle: 36" (1 worker), 42" (2 workers), 48–60" (mobile equipment/main lanes)	Eliminate partitions, use right-angle work centers
Work Tables	Width: 24–42" based on useHeight: ~34"	Shared use: 8–10 ft length
Storage Requirements	Food for 1,000 = 500 sq ft for 30 days	45 cases per 100 persons/monthStack height: ~72" (8–9 cases)
Store Room Aisles	Min. 36"Preferred: 42–48"	Wider for trucks; add shelf thickness when calculating spacing
Receiving Area	Dock: ~8 ft × 12 ft for regular ops	Larger areas needed for bulk deliveries

Type of facility	Estimated maximum meals per hour				
	200 or less	200–400	400–800	800–1,300	1,300–7,500
Cafeterias	7.5–5.0	5.0–4.0	4.0–3.5	3.5–3.0	3.0–1.6
Hospitals	18.0–4.5	12.0–4.5	11.0–4.5	10.0–4.0	8.0–4.0
Hotels	18.0–4.0	7.5–3.0	6.0–3.0	4.0–3.0	4.0–3.0
Industrial lunchrooms	7.5–5.0	4.0–3.2	3.5–2.0	3.0–2.0	2.5–1.7
Lunch counters	7.5–2.0	2.0–1.5			
Railroad dining car	1.6				
Restaurants (service)	7.0–4.0	5.0–3.6	5.0–3.6	5.0–3.0	5.0–3.0
School lunchrooms	4.0–3.3	3.3–2.2	3.0–2.0	2.5–1.6	2.0–1.6

Figure 36 Estimated meal per hours

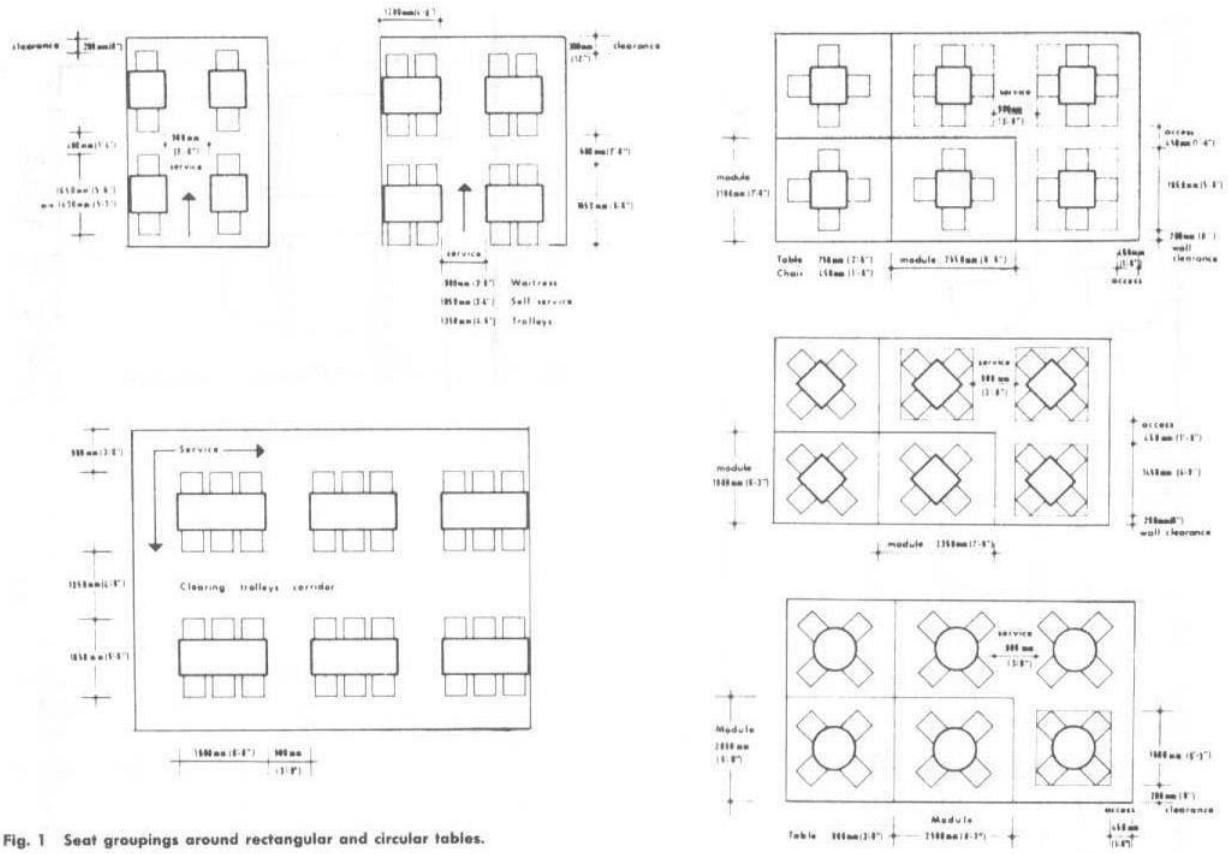


Fig. 1 Seat groupings around rectangular and circular tables.

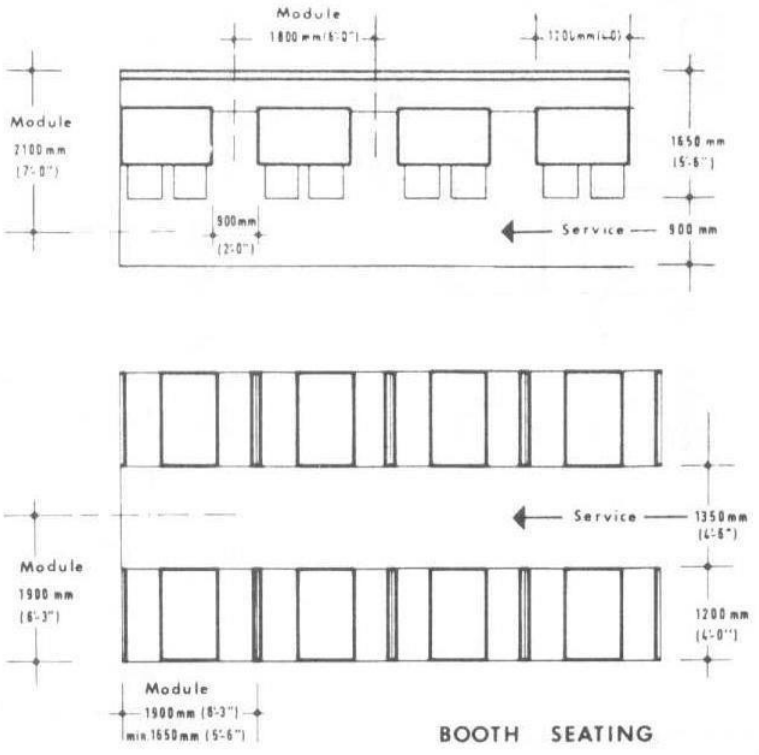
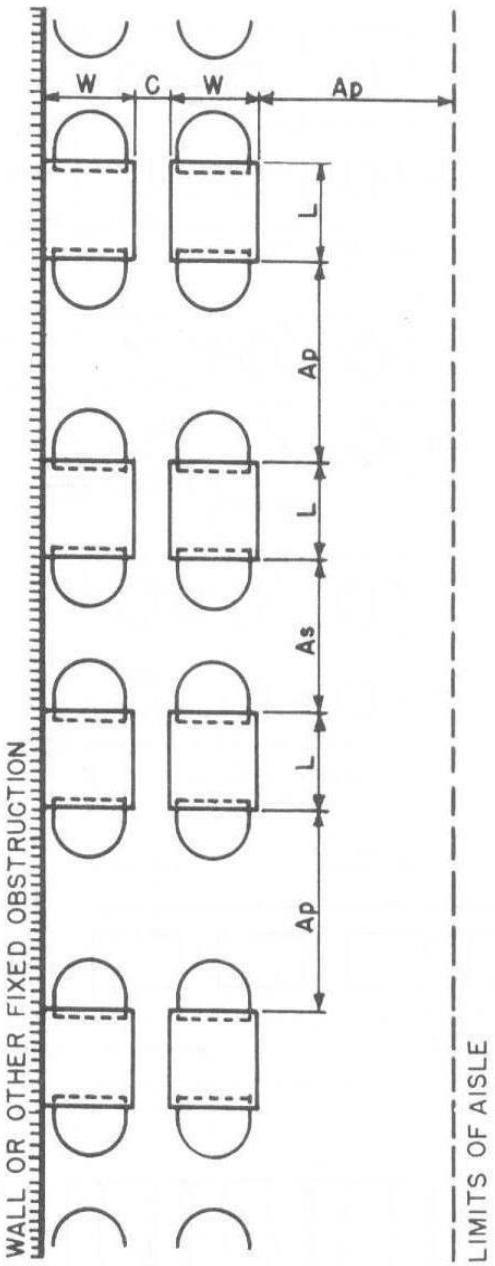
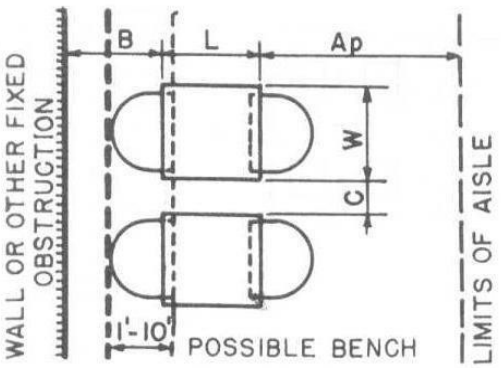


Fig. 2 Banquette seating arrangements and limiting dimensions including space for access and service.

Fred Lawson, *Restaurant Planning and Design*, The Architectural Press, Ltd., London, 1973.

Figure 37 Seating Arrangements (TSS)





		Abs. Min.	Des. Min.	Comfort-able
Ap	Public circ'n	3–0 to 4–6	3–6 to 5–0	3–9 to 5–0
As	Service aisle	3–6 to 4–6	4–0 to 5–0	4–0 to 5–6
B	To wall	1–8 to 2–0	2–0 to 2–6	2–0 to 3–0
C	Between units	0 to 8	6 to 1–0	1–0
	Length	1–8 to 2–0	2–3 to 2–4	2–4 to 2–6
	Width	1–8 to 2–0	2–2 to 2–3	2–4 to 2–6

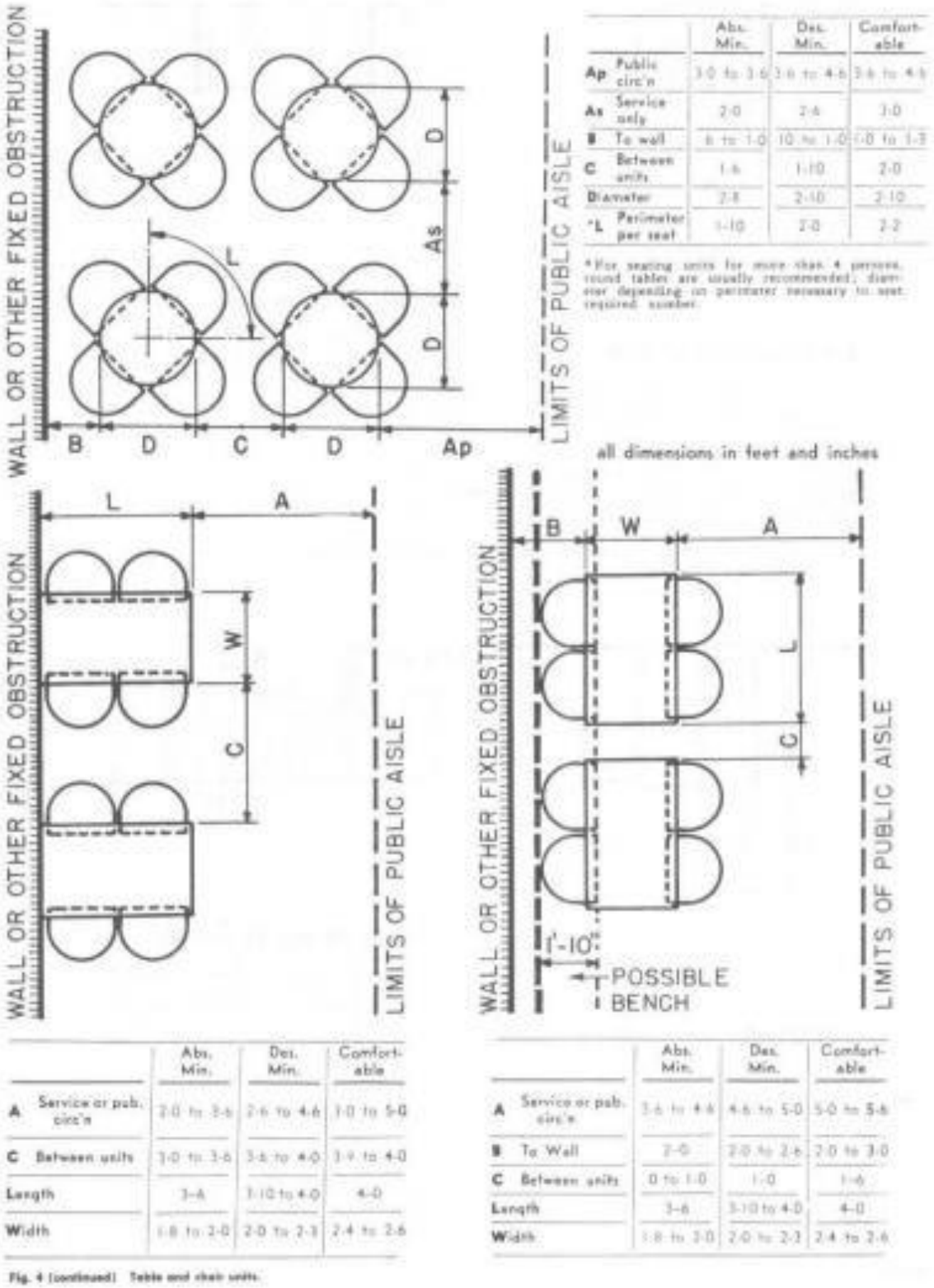
all dimensions in feet and inches

		Abs. Min.	Des. Min.	Comfort-able
Ap	Public circ'n	*1–10 to 4–6	2–3 to 5–0	3–0 to 5–0
As	Service aisle	3–0 to 3–6	3–6 to 4–0	3–9 to 4–0
C	Between units	0 to 3	4 to 6	6
	Length	1–8 to 2–0	2–3 to 2–4	2–4 to 2–6
	Width	1–8 to 2–0	2–2 to 2–3	2–4 to 2–6

*Lower range only if chairs, etc., do not project into aisle

Fig. 4 Table and chair units.

Figure 38 Table & Chair Units (TSS)



		Abs. Min.	Des. Min.	Comfortable
Ap	Public circ'n	3-0 to 3-6	3-6 to 4-6	5-6 to 4-6
As	Service only	2-0	2-6	3-0
B	To wall	6 to 1-0	10 to 1-0	1-0 to 1-3
C	Between units	1-6	1-10	2-0
	Diameter	2-8	2-10	2-10
*L	Perimeter per seat	1-10	2-0	2-2

*For seating units for more than 4 persons, round tables are usually recommended; diameter depending on perimeter necessary to seat required number.

		Abs. Min.	Des. Min.	Comfortable
A	Service or pub. circ'n	2-0 to 3-6	2-6 to 4-6	3-0 to 5-0
C	Between units	1-0 to 3-6	3-6 to 4-0	3-9 to 4-0
	Length	3-6	3-10 to 4-0	4-0
	Width	1-8 to 2-0	2-0 to 2-3	2-4 to 2-6

		Abs. Min.	Des. Min.	Comfortable
A	Service or pub. circ'n	3-6 to 4-6	4-6 to 5-0	5-0 to 5-6
B	To Wall	2-0	2-0 to 2-6	2-0 to 3-0
C	Between units	0 to 1-0	1-0	1-6
	Length	3-6	3-10 to 4-0	4-0
	Width	1-8 to 2-0	2-0 to 2-3	2-4 to 2-6

Fig. 4 (continued) Table and chair units.

Figure 39 Table & Units (TSS)

CHAPTER 3

SITE INVENTORY

3.1 INTRODUCTION

This "City of Destiny" offers a unique blend of industrial vitality, a growing MICE (Meetings, Incentives, Conferences, and Exhibitions) market, and stunning coastal beauty, presenting a clear opportunity for a high-end hospitality and event hub.

Table 36 Connectivity and proximity

Amenity / Landmark	**Approximate Distance from Site**	**Connectivity / Access**
Ramakrishna (RK) Beach	4 km	Coastal promenade along Beach Road; well-serviced by APSRTC buses (e.g. route 10K, 28 variants)
Beach Road (Dr. NTR Beach Rd.)	Adjacent / immediate	Major scenic thoroughfare with pedestrian pathways, cycling track, cultural landmarks (Mandapam, parks)
Visakhapatnam Railway Junction	6 km	Eight-platform major rail hub; frequent long-distance and suburban trains
Dwaraka (RTC) Bus Station	4 km	Major state and interstate bus terminus; serviced by city buses and taxi access
Maddilapalem Bus Station	4 km	Municipal transit hub with frequent APSRTC routes and feeder connections to city centre
Visakhapatnam International Airport {Customs airport}, operated by Indian Navy on INS Dega Airbase	16 km	Major commercial hub; well-connected via APSRTC city buses and road network
Hanumanthavaka Junction	6 km	Interchange junction on NH16; BRTS connecting to Simhachalam and other city zones

Visakhapatnam Port Connectivity Road (New Six-Lane)	5 km	Underway NH-516C linking Sabbavaram bypass to Sheelanagar; improves connectivity to Visakhapatnam Port
Future Coastal Highway (Mulapeta–Bheemili)	15 km	200 km greenfield highway approved for improved coastal logistics and tourism movement
Nearest AAI operated airport	200 km	Rajamundry International Airport

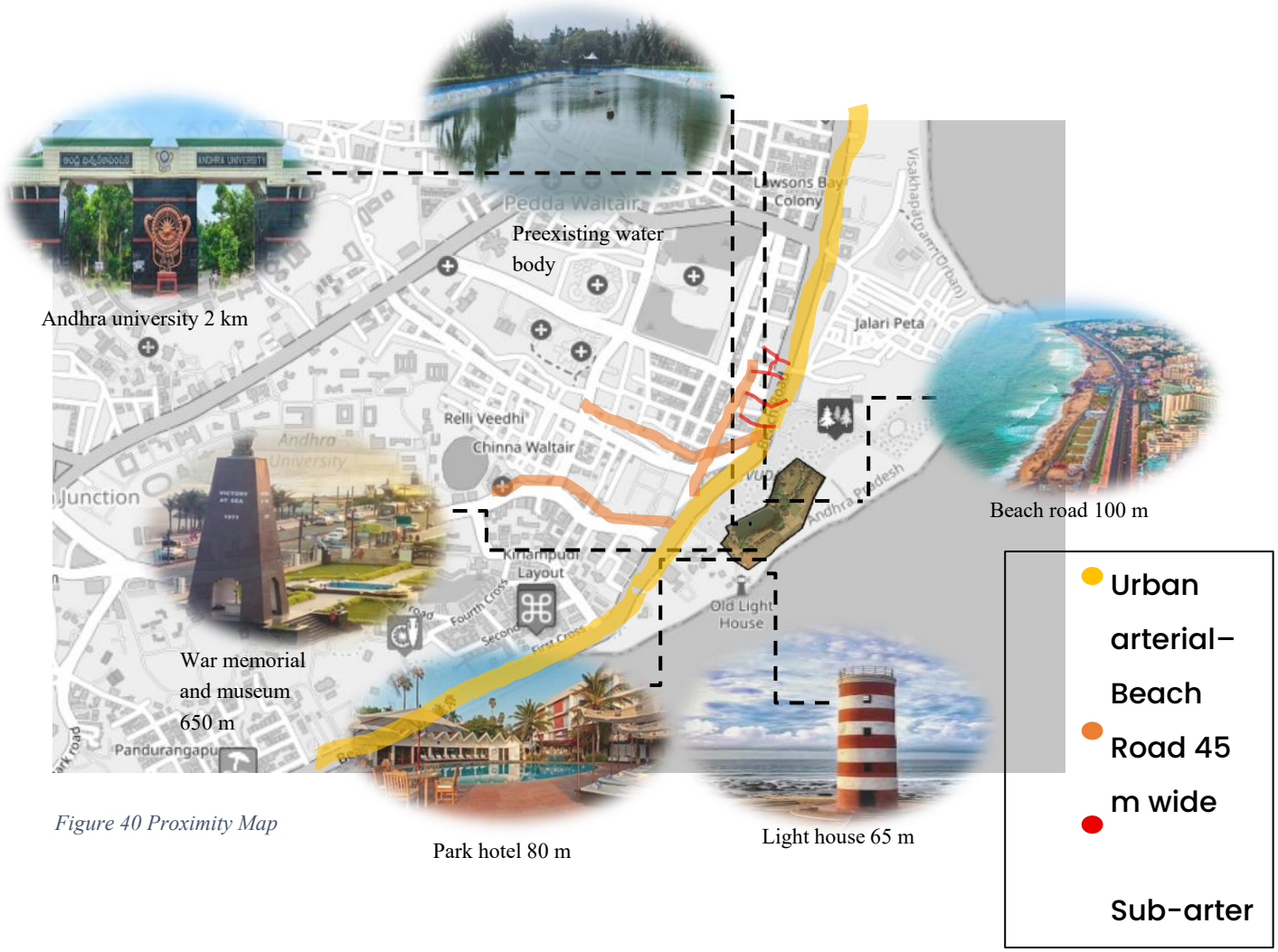


Figure 40 Proximity Map

3.1.1 Topography & Geology

The site is expected to be **relatively flat or gently sloping towards the Bay of Bengal**, typical for large-scale coastal developments. Predominant **sandy loams** near the coast.

3.1.2 Waterfront & Hydrology

The site's direct interface with the Bay of Bengal is a pivotal aspect, profoundly influencing the project's identity, guest experience, and the core "waterfront activity" vision.

Table 37 Hydrological data

Parameter	Description / value (illustrative)	Relevance to project
Tidal Range	Mean High Water (MHW): ~1.5m, Mean Low Water (MLW): ~0.5m	Influences design of marine structures (jetties, pontoons), flood protection, and accessibility for water activities.
Prevailing Currents	Generally weak, but can be stronger during monsoon; North-South direction	Impacts water quality dispersion, sediment transport, and safety for swimming/boating.
Typical Wave Heights	Average: 0.5-1.0m; Extreme (during cyclones): 3-5m+	Critical for structural design of coastal defenses, breakwaters, and resilience of waterfront amenities.
Water Depth Profiles	Gradual slope from shore, reaching ~5m depth at 100m offshore	Determines feasibility of various watercraft, swimming zones, and dredging requirements.
CRZ Classification	To be confirmed, but likely CRZ-II (Developed Area)	Dictates permissible construction setbacks, FAR, and types of activities allowed on the waterfront.
Water Quality (Key Indicators)	Dissolved Oxygen (DO): 4-6 mg/L; BOD: 5-10 mg/L; Coliform: High (indicative of sewage)	Direct impact on recreational use suitability, marine life, and project's environmental responsibility.

3.1.3 Climatic Conditions and Environmental Factors

Visakhapatnam's tropical climate, with high temperatures and humidity, necessitates advanced passive cooling. Heavy monsoons demand robust stormwater management.

Crucially, cyclone susceptibility and storm surge risks mandate a "resilience-first" design, ensuring structural integrity and guest safety for this 5-star coastal development.

Table 38 Climatic conditions

Climatic Parameter	**Annual Average / Typical Range**	**Extreme Event Data / Seasonality**	**Relevance to Design**
Temperature	27.2°C (Annual Avg.)	Hottest Month (May): 30.0°C; Coolest Month (Jan): 23.9°C	HVAC sizing, material selection, passive cooling strategies.
Humidity	80% (Morning), 70% (Evening)	Consistently high year-round	Dehumidification, mold prevention, material durability.
Rainfall	1118.8 mm (Annual Avg.)	Southwest Monsoon (Jun-Oct), Northeast Monsoon (Oct-Dec)	Stormwater management, drainage, waterproofing.
Prevailing Winds	SW (Monsoon), NE (Winter)	Sea breeze moderates coastal areas	Natural ventilation, wind load analysis, outdoor comfort.
Cyclones	Common in Oct-Nov	Hudhud (2014), Titli (2018), Phethai (2018) caused significant damage	Structural resilience, storm surge protection, emergency planning.
Sea Level Rise	Ongoing concern for coastal cities	Future projections to be considered	Site elevation, flood protection, long-term resilience.

3.1.4 ASML {Average MEAN SEA LEVEL}

Table 39 Basic terminologies for AAI

Term	**Explanation**
Ground Elevation (AMSL)	Your site’s surveyed elevation relative to sea level.
Permitted Top Elevation (AMSL)	AAI-assigned upper limit for your structure’s total elevation, ensuring it doesn’t breach aviation safety surfaces.

Allowed Structure Height (AGL)	Permitted Top Elevation minus Ground Elevation.

Max Structure Height (AGL)=Permitted Top Elevation (AMSL)−Site Elevation (AMSL

IFR – Instrument Flight Rules

Flights under IFR are primarily conducted with reference to aircraft instruments rather than visual cues. IFR operations are characteristic of major airports that handle significant air traffic, including international flights, and are supported by comprehensive air traffic control services. Such airports are equipped with extensive radar coverage, advanced navigational aids, and longer runways to accommodate diverse aircraft operations.

For the purpose of AAI clearance, if a proposed site is located beyond **56 km from an IFR airport**, and the proposed structure's height is **less than 150 m above ground level (AGL)**, a No Objection Certificate (NOC) is generally not required.

Distance of nearest AAI airport from site – 200 m, So permissible height – 150 m MSL.

Table 40 Aerodromes operated by aai and joint venture companies

Airport	Coordinates	Aerodrome Elevation in Mtrs.	Runway	Dimension In Mtrs	Type of operation (in NOCAS)
RAJAHMUNDARY	170634N 0814910E	46.33	05/23	3165x45	IFR

3.1.5 SEISMIC ANALYSIS

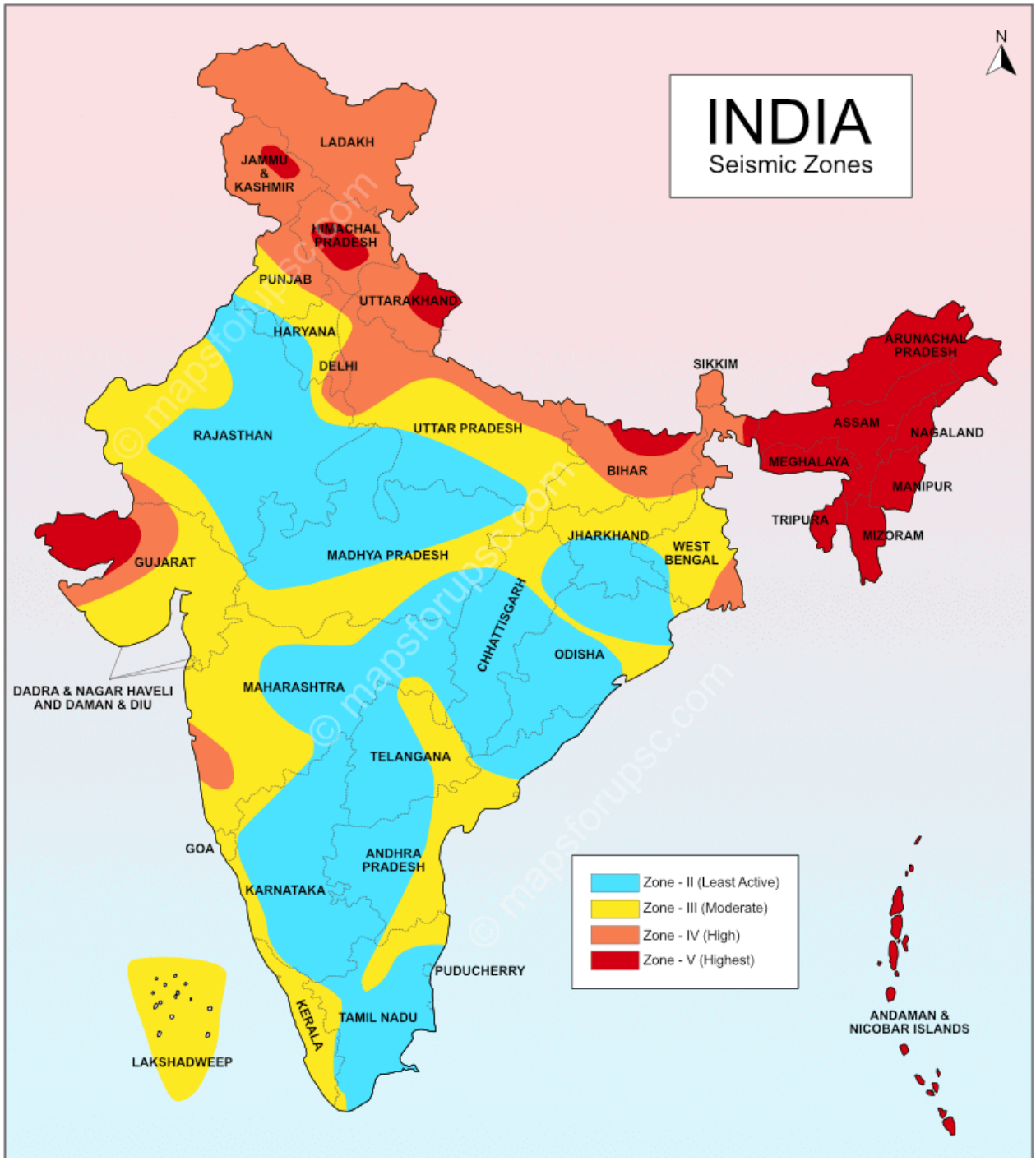


Figure 41 Seismic map

Table 41 Sesmic analysis

Parameter	**Details**

Seismic Zone	**Zone II** (Low to Moderate seismic risk) As per IS 1893:2016 Seismic Zoning Map of India.
Zone Factor (Z)	**0.10** (as per IS 1893)
Soil Type (assumed)	Likely **Type II (Medium soil)** based on typical coastal soil profile (marine clay + sand)
Importance Factor (I)	**1.5** (for important public buildings like hotels & convention centres)
Response Reduction Factor (R)	**5.0** (for Special RC moment-resisting frame – ductile design)
Design Seismic Coefficient (Ah)	Ah = (Z * I * Sa/g) / (R)Where Sa/g depends on time period and damping
Design Base Shear (Vb)	Vb = Ah × WWhere W is total seismic weight of structure

Subsurface Profile

The site is characterized by **soft to medium coastal soils** typical of the Visakhapatnam coastline. These soils often have a **high groundwater table**, which can affect stability and bearing capacity. As a result, **pile foundations** are likely required to ensure structural safety and performance under both static and dynamic (seismic) loads.

Liquefaction Susceptibility

Given the site's proximity to the shoreline and the presence of **loose, saturated sandy soils**, there is a **moderate risk of liquefaction** during seismic events. This necessitates a **detailed geotechnical investigation**, including Standard Penetration Tests (SPT) and Cone Penetration Tests (CPT), to accurately assess liquefaction potential and recommend appropriate mitigation strategies.

Slope & Tsunami Risk

Although Visakhapatnam has relatively stable coastal slopes, **site elevation mapping and tsunami risk modeling** are essential due to its location along the Bay of Bengal. The site should incorporate a **coastal buffer zone** as per CRZ norms and integrate **emergency design features**, such as elevated plinths, flood-resistant materials, and designated refuge zones to mitigate the impact of potential tsunami or storm surge events.

3.1.6 Infrastructure and Accessibility Assessment

Figure 42 Acessibility

Utility Service	**Key Data Points (Illustrative)**	**Relevance to Project**

Water Supply	Source: Gosthani & Godavari Rivers; Estimated Daily Available Municipal Supply: 1.5-2.0 ML/day; Pressure: Moderate (needs booster pumps); Quality: Generally good, but requires on-site treatment for potable use.	Ensures adequate supply for high demand; informs need for on-site storage, treatment, and potential reuse.
Electricity Supply	Provider: APTRANSCO; Connection: Available at site boundary; Capacity: 5-8 MVA; Grid Reliability: Occasional outages (2-3/month, avg. 2-4 hrs); Cost: Commercial tariffs apply.	Determines power infrastructure requirements, need for robust backup generation (e.g., diesel, solar), and energy efficiency strategies.
Sewerage	Connection: Municipal sewer line nearby; Capacity: "Improving", potentially limited for large development; Treatment: Basic municipal treatment; Discharge: Bay of Bengal (concerns about water quality).	Highlights need for advanced on-site Sewage Treatment Plant (STP) and treated water reuse to meet environmental standards and operational demands.
Telecommunications	Fiber Optic: Available; Mobile Network: Excellent 4G/5G coverage; ISPs: Multiple major providers; Bandwidth: High-speed connectivity feasible.	Critical for convention center operations, guest connectivity, and smart building systems.
Road Access	Proximity: Direct access to local roads, close to NH16; Width: 2-lane local road; Condition: Good; Traffic Volume: Moderate, but peak event traffic could be high.	Influences traffic impact assessment, access design (drop-off/pick-up), parking strategy, and potential for road upgrades.

Vegetation on site

S.No.	Name of the plant	Family	Local (Telugu) Name	Common Name
1	*Acacia auriculiformis* Benth.	Mimosaceae	Australia tumma	Australian Oke
2	*Adenanthera pavonina* L.	Mimosaceae	Bandi gurivinda	Peacock flower fence
3	*Aegle marmelos* (L.) Correa	Rutaceae	Maaredu	Bengal Quince
4	*Ailanthus excelsa* Roxb.	Simaroubaceae	Peddamanu	Indian Tree of Heaven
5	*Alangium salvifolium* (L. f.) Wangerin	Alangiaceae	Uduga	Sage-leaved alangium
6	*Albizia chinensis* (Osbeck) Merr.	Mimosaceae	Chinduga	Chinese albizia
7	*Albizia lebbeck* (L.) Willd.	Mimosaceae	Dirisena, Siresha puspam	East Indian Walnut
8	*Albizia saman* (Jacq.) Merr.	Mimosaceae	Nidraganneru	Rain Tree
9	*Alstonia scholaris* (L.) R.Br.	Apocynaceae	Edakula pala	Devil tree, white cheesewood
10	*Alstonia venenata* R.Br.	Apocynaceae	Chinna edakula pala	Poison Devil Tree
11	*Anacardium occidentale* L.	Anacardiaceae	Zeedimamidi	Cashe Nut
12	*Annona reticulata* L.	Annonaceae	Rama phalam	Bull's heart
13	*Annona squamosa* L.	Annonaceae	Seeta phalam	Custard apple
14	*Anogeissus acuminata* (Roxb. ex DC.) Guill. & Seneg.	Combretaceae	Pasi chettu	Button tree
15	*Anogeissus latifolia* (Roxb. ex DC.) Wall.	Combretaceae	Sirimanu	Axlewood
16	*Araucaria columnaris* (Forst.) Hk.	Araucariaceae	Christmas tree	Monkey puzzle tree
17	*Areca catechu* L.	Arecaceae	Pokachekka	Areca palm

3.1.7 Nearby Places of Interest and Amenities

This section identifies and analyzes attractions and amenities in the vicinity that can enhance the guest experience and attract MICE delegates, significantly contributing to the project's market appeal and competitive advantage.

3.1.8 Cultural and Historical Sites

The site's proximity to significant cultural and historical landmarks in Visakhapatnam, such as the ancient Simhachalam Temple, offers rich opportunities for cultural immersion and historical exploration for hotel guests and convention attendees. There is potential for developing curated tours or cultural experiences that leverage these local assets, thereby enhancing the overall destination appeal and providing unique offerings for delegates.

Recreational and Natural Attractions

Nearby beaches, including Rushikonda, Yarada, and Bheemili, offer significant potential for beach tourism, relaxation, and a variety of water sports. Kailasagiri, a prominent hilltop park, provides panoramic views of the city and coastline, serving as a unique recreational and scenic attraction. The Submarine Museum is another distinctive tourist attraction that adds to the city's unique offerings. Leveraging the site's direct waterfront access, there is potential for developing bespoke recreational activities, such as non-motorized water sports (e.g., kayaking, paddleboarding), curated boat tours of the coastline, designated fishing zones, and the development of a vibrant public promenade.

Commercial and Hospitality Establishments

Proximity to existing commercial centers, shopping districts, dining options, and entertainment venues within Visakhapatnam provides convenience for guests and delegates. An analysis of the competitive landscape, including existing 5-star hotels like Novotel, Radisson Blu, and Taj Gateway, is crucial. This information informs the need for differentiation and the development of unique selling propositions for the proposed project. Opportunities for collaboration with local businesses or for the project itself to become a new commercial hub should also be considered.

Educational and Healthcare Facilities

The site's proximity to major universities, research institutions, and reputable hospitals is relevant for attracting specialized conventions (e.g., medical, academic conferences) and for ensuring emergency medical services are readily available for guests and staff. Furthermore, the availability of a skilled workforce from local educational institutions presents a valuable resource for potential employment opportunities within the hotel and convention center.

CONSUMER ANALYSIS

Table 42 Main Customer Types Table

Customer type	***Typical stay (nights)***	***Room type & rate (inr/night)***	***Trip purpose & frequency***	***Key preferences***
Corporate Business Travelers	1–3	Deluxe Room: ₹12,000–₹18,000	Monthly or quarterly trips	Fast Wi-Fi, in-room work desk, meeting room access
Affluent Leisure Travelers	2–5	Deluxe Room: ₹12,000–₹18,000	2–3 leisure trips annually	Seaside views, pool/SPA access, curated local excursions
High-Net-Worth Individuals (HNWIs)	3–5	Suite: ₹28,000–₹45,000	2–4 trips annually	Privacy, personalized butler service, premium amenities
Special Occasion Celebrants	2–4	Suite: ₹28,000–₹45,000	As needed for events	Event planning, customized décor, private dining options

Table 43 Customer Behavioral Patterns

Customer Segment	Stay Duration	Seasonal Patterns	Group Characteristics	Decision Factors
High-Net-Worth Individuals	3–7 days average	Year-round, avoid peak seasons	Couples (60%), small exclusive groups	Service quality, privacy, uniqueness
Ultra-High-Net-Worth	5–10+ days for exclusive trips	Year-round, prefer exclusivity	Very small groups, maximum privacy	Ultimate exclusivity and personalization
Corporate Business Travelers	1–3 days typical	Peak during business seasons	Individual travelers primarily	Location, amenities, corporate rates
Leisure Travelers	4–10 days for leisure	Holiday seasons, summer, winter	Couples, families, friend groups	Value, location, amenities, reviews
Special Occasion Celebrants	2–5 days for events	Major holidays, personal milestones	Variable based on celebration type	Event capabilities, memorable experiences
Wellness Travelers	4–7 days wellness retreats	Year-round, prefer quiet seasons	Individual, couples, small groups	Wellness facilities, tranquil environment
Experiential Travelers	5–12 days cultural immersion	Cultural seasons, festivals	Couples, small cultural groups	Cultural authenticity, unique experiences

3.1.9 Demgraphics

Population and Age Distribution

Total city population: ~18 lakhs (2011 Census)

Age breakdown (approx.):

0–14 years: 23%

15–34 years: 34%

35–54 years: 25%

55+ years: 18%

Income and Occupation

Average household income: ₹4–6 lakhs per year

Key employment sectors:

Information Technology and ITES (15% of workforce)

Heavy industry and manufacturing (25%)

Shipping and port services (12%)

Tourism, hospitality and retail (20%)

Government and public administration (10%)

Agriculture and allied (rural periphery, 18%)

Education and Literacy

Overall literacy rate: 84%

Female literacy: 79%

Post-secondary degree holders (college and above): ~35% of adult population

3.2 CULTURE AND Major tribes

The major types of tribes in Visakhapatnam district, Andhra Pradesh, primarily belong to the Eastern Ghats tribal communities. These tribes are mostly concentrated in the agency areas such as Paderu and Araku regions. The key tribes include:

Bagata

The dominant tribal community both socially and politically

Traditionally engaged in agriculture and village leadership roles

Konda Dora (or Konda Kammara)

Largest tribe in sample studies (about 76%)

Primarily involved in cultivation and wage labor

Found mainly in agency areas

Gadaba

Known for terrace and wet cultivation

Settled in fertile valleys, considered relatively primitive

Khond

One of the more primitive tribes

Has sub-groups such as Jatapu Dora, Dongria, and Kutia

Traditionally dependent on forest-based livelihoods

Porja

Another forest-based tribal community with primitive lifestyle

Traditionally involved in forest and hill agriculture

Valmiki

Migrated during colonial times as Vetti community

Lowest in the tribal social hierarchy

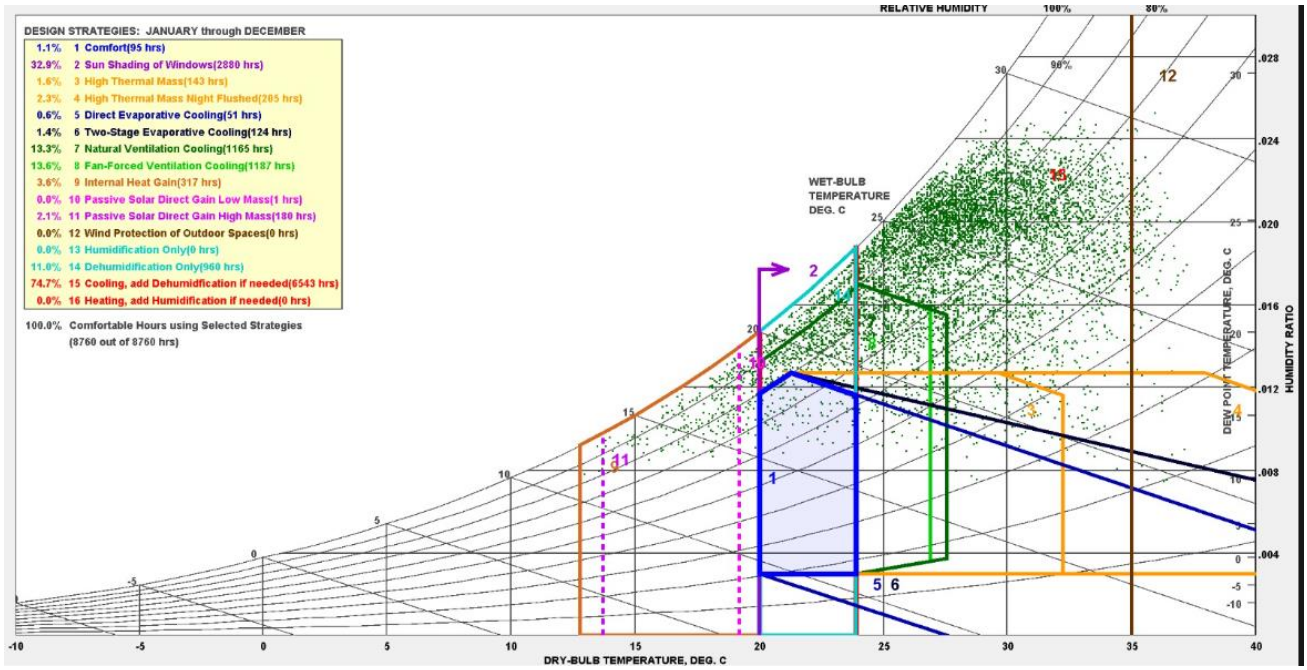
Inhabit plains and work largely in agriculture and wage labor

Other tribal groups present include Kotiya, Konda Kapu, Nooka Dora, Mannedora, Savaras, and Sugalis/Lambadis.

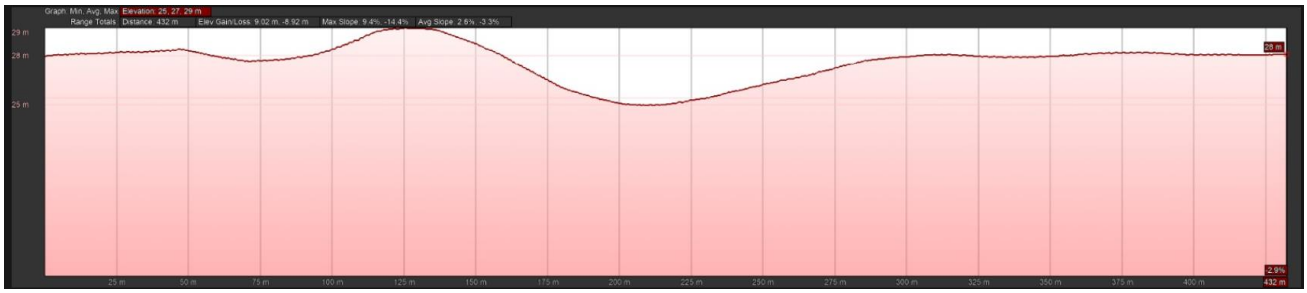
These tribes largely depend on agriculture (including terrace and wet cultivation), forest produce, and wage labor for their livelihood, and maintain distinct cultural and social traditions in the region.

3.3 GRAPHS OF CLIMATIC ANALYSIS

PSYCHROMATRIC CHART

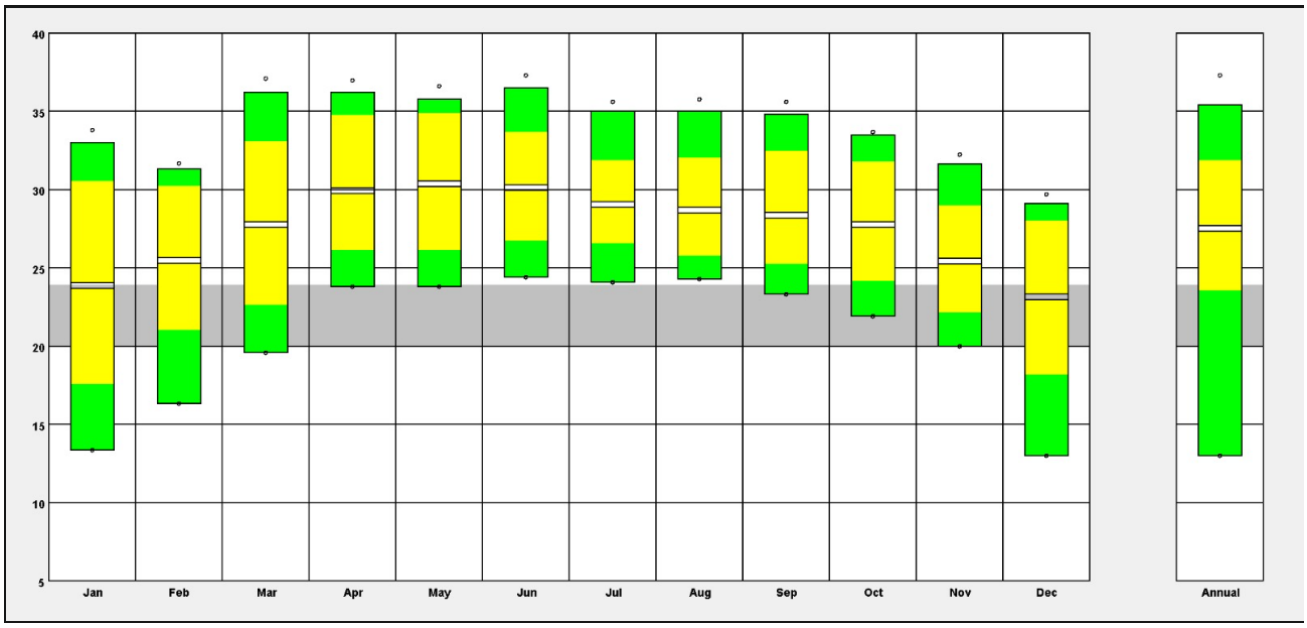


SITE SECTIONS

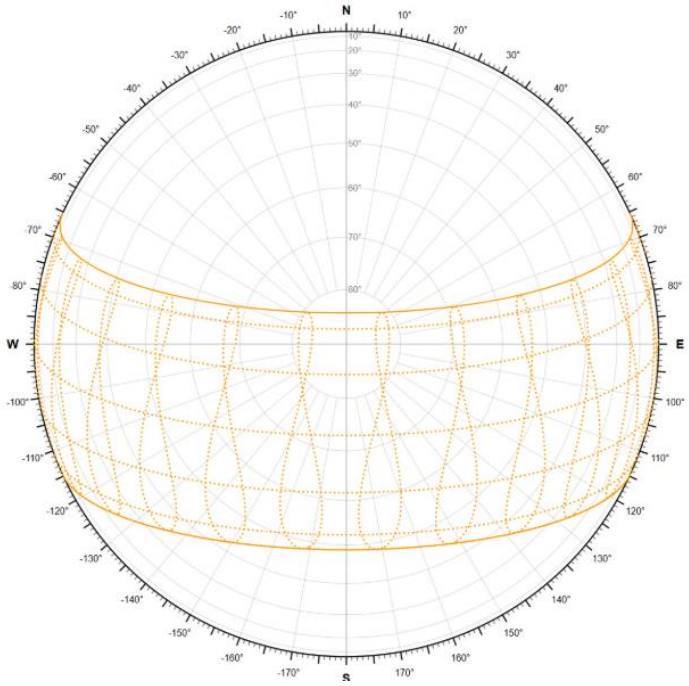




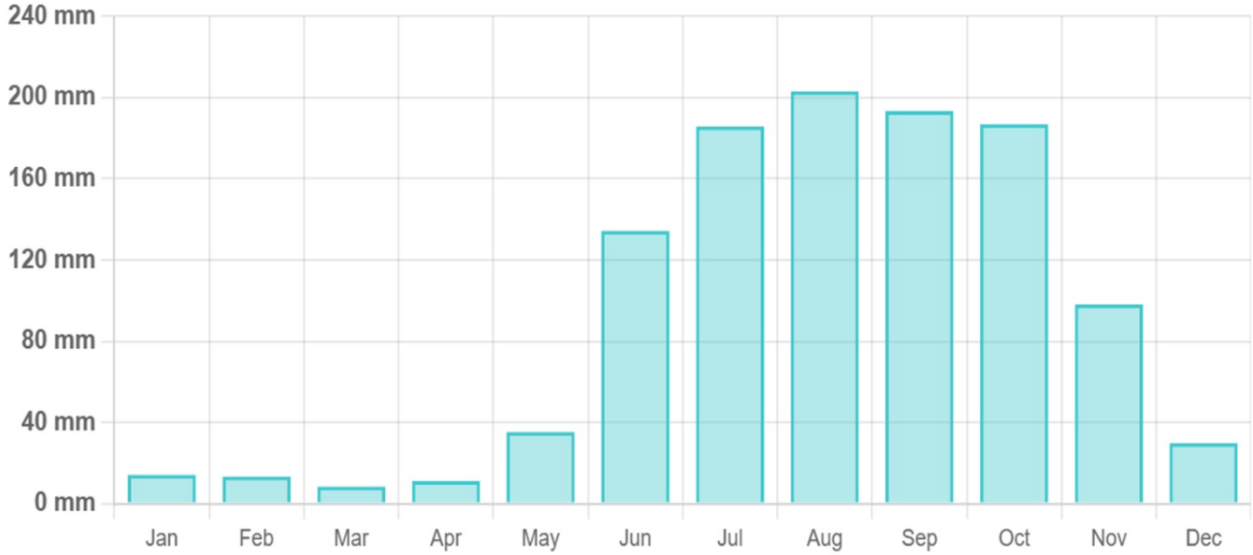
TEMPERATURE CHART



SUN PATH



ANNUAL RAINFALL



WIND SPEED

CHAPTER 4

CASE STUDIES

LIVE CASE STUDIES

4.1 NOVOTEL 5 STAR HOTEL, VISHAKPATNAM, ANDHRA PRADESH

AIM- To understand local context for “luxury hotel”.

Table 44 Overview of Novotel Vizag

Item	Data
Name	Novotel vishakapatnam
Location	Varun beach vishakapatnam
Developer	Accor
Area	2.8 acres
Year of opening	2012
Key facilities	Guest facilities 225 rooms divided into various catergories 160 superior rooms 55 premium rooms 9 suites 1 presedential suite 11 banquet halls 1 convention hall 3 multi cuisine restraunts 1 bar Gift shop Infinity swimming pool Jogging track 3 level underground parking with 1200 capacity

	2 basement floors Kids activity area Spa, sauna, salon, therapy rooms Lounge and reception area Gymnassium
Addl.activities and spaces	Kids activity area Xbox area Tourist circuit office Backdoor operation spaces Inox movie theatre

4.1.1 ABOUT THE PROJECT

Located adjacent to Varun Inox Multiplex and close to the airport, Novotel Visakhapatnam Varun Beach has a panoramic view of Bay of Bengal. All 225 rooms overlook the ocean, offering a comfortable environment to business and leisure travellers with Wi-Fi access, three restaurants, an executive lounge, bar and spa. With over 3600 sqm of indoor & outdoor space, the hotel provides the largest banqueting facility in the region, and is able to cater for business and social events of up to 4000 people.

4.1.2 SITE CHARACTERISITICS

Location and Land : The site is located at Varun Beach,Vishakapatnam.

Site Area : 2.8 Acres of campus with Inox Movie Theatre.

Connectivity :

Airport : 12kms from Vizag Airport

Railway Station : 4.1 kms from Vizag Railway Station

Road: 350m from RK Beach

Climate : Tropical Warm-humid climate




4.1.3 ARCHITECTURAL FEATURES

Room details

- Novotel Varun beach Vishakhapatnam Hotel has total of 225 rooms for guests.
- Superior Room (Entry Level) 160 nos
- Premium Rooms (Mid level) 55 nos
- Suites (Upper level Rooms) 9 nos
- Presidential suite (for VVIPs and Director) 1 nos Includes Personal meeting room a mini bar small kitchenette.
- X shaped layout of building providing Ocean views from all rooms and public spaces

TOTAL NUMBER OF FLOORS- 14 floors.

Level T

- Avenue Banquet Hall 470pax
- Pan Asian Roof top restaurant
- Jogging Track

Level 1 to 6

- Guest rooms
- Presidential suite on 6th floor

Level C

- 24 hrs Gymnasium
- Spa and Salon

- Summit Banquet hall 50pax
- Eureka Banquet/Meeting hall 50pax
- Nautica Banquet hall 120pax
- Varun chambers

Level L

- Reception
- Tourist Circuit Desk
- The square, Harbour, Zaffran, Sugarr
- Infinity Swimming Pool
- Outdoor Seating

Level M

- Administration

Level B

- Business Centre
- Pearl 1 Meeting hall/banquet hall 50 pax
- Pearl 2 Conference Hall 18pax
- V Convention 1,2,3 1700pax
- Coral Exhibition/Banquet hall 1,2,3 220pax

3 level Underground Parking

- Capacity of 440 cars per floors.

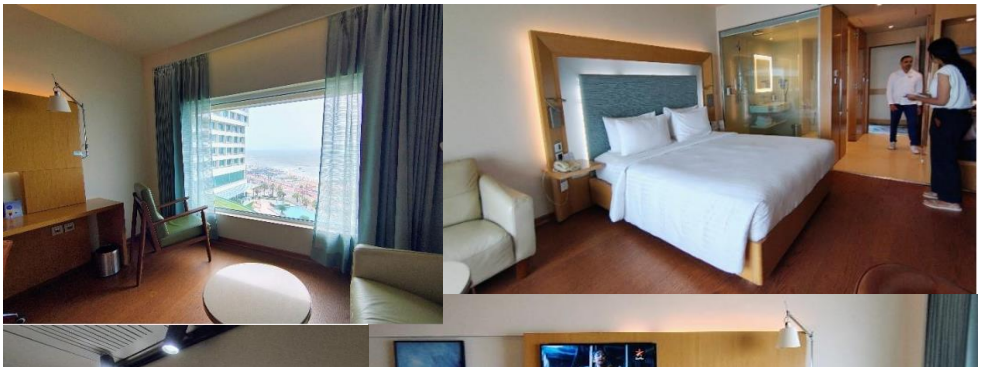
Other take ways

- Glass façade of reception area for capturing maximum daylight as well as Sea view
- Guest Elevators
- Guest Staircase
- Fire exit staircase
- 3 Service Elevators and 1 Service staircase

4.1.4 DESIGN PRINCIPLES

- **View Optimization:** Panoramic Ocean Views, All 225 rooms overlook the Bay of Bengal, so spatial planning prioritizes visual access to the sea.
- Infinity swimming Pool for maximum visibility of sea.
- **Luxury + functionality**: Separate zones for business (banquets, meeting lounges), leisure (spa, bar, pool), and hospitality (guest rooms)
- **Disaster Preparedness (Cyclone-Resilient)**: Storme drainage planning, Reinforced structure, Elevated plinths.

PHOTO GALLERY



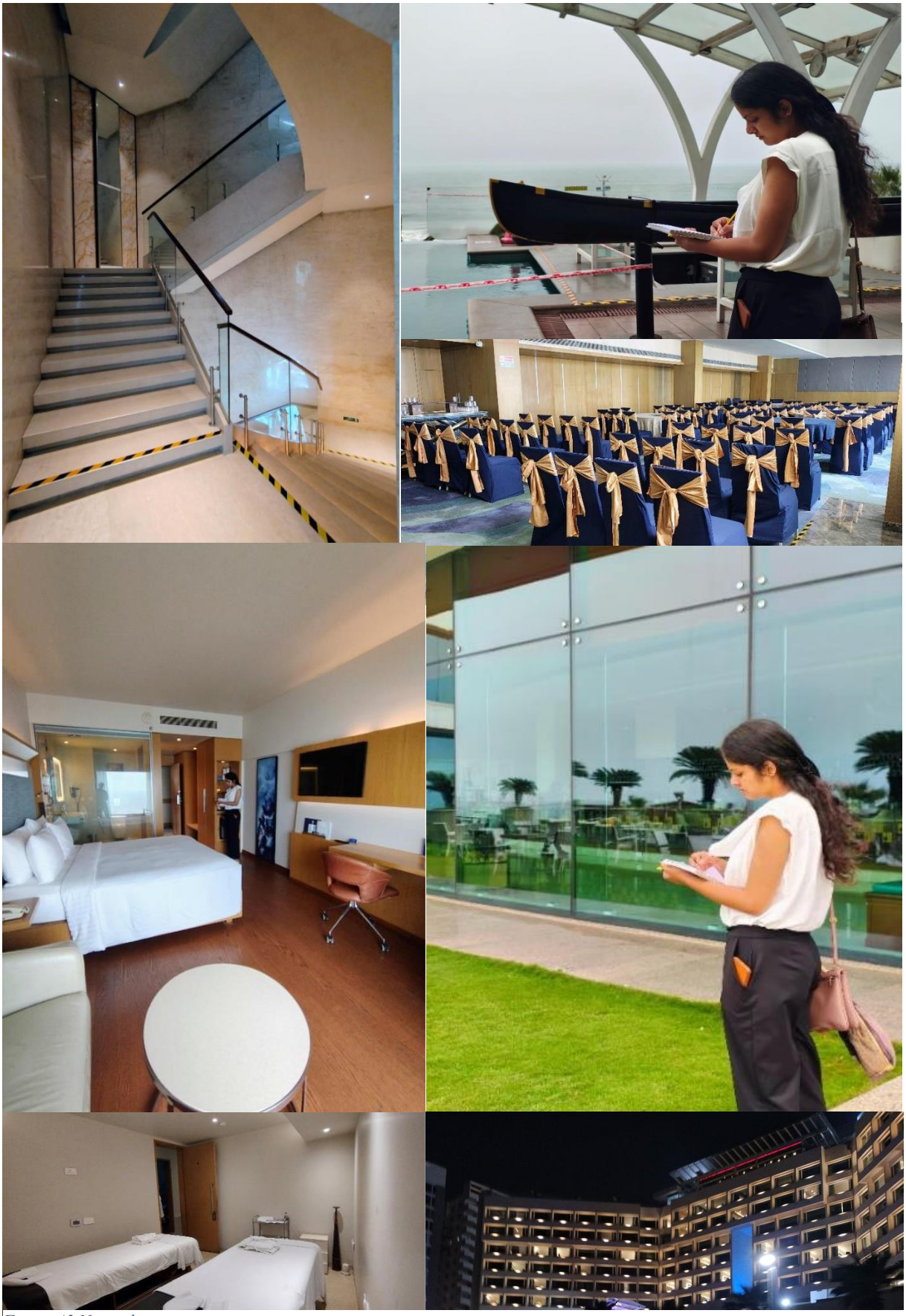


Figure 43 Novotel pictures

4.1.5 INFERENCES

Table 45 Design inferences

Aspect	**Observation**	**Inference / Design Learning**
Location & Connectivity	Situated on Beach Road with direct sea view and urban accessibility	Strategic siting enhances tourism value; however, contributes to pressure on ecologically sensitive coastal zones
Site Orientation	East-facing with panoramic ocean views	Follows optimal orientation for passive ventilation and guest experience, but over-relies on view commodification
Zoning & Land Use	Located in commercial-tourism mixed zone in the city core	Suitable for high-intensity hospitality use, but lacks graded transitions between public promenade and private domain
Building Height & Massing	G+5 structure with a stepped profile toward the ocean	Height and form offer views and reduce bulk, but visually dominate the low-lying coastal skyline
Setbacks & Open Space	Generous front setback; rear service access	Provides privacy and sea-facing open space, yet limited public realm integration or civic engagement
Access & Circulation	Separate entries for guests, services, and banquet functions	Ensures operational clarity but disrupts pedestrian flow during high-traffic events
Public–Private Transition	Grand lobby transitions to ocean-facing terraces and restaurants	Blurs boundaries between indoors and outdoors for guests, but restricts visual and physical access for the local community
Landscape Integration	Decorative landscaping, mostly hardscape and exotic species	Offers visual appeal, but lacks native coastal vegetation or ecological design principles
Convention & Banquet Areas	Large event spaces with independent access and sea views	Supports MICE tourism, but high energy loads and glass surfaces increase environmental impact
Room Layout	Uniform, sea-oriented rooms with balconies; limited spatial diversity	Maximizes revenue-generating views, but lacks architectural variety and contextual sensitivity
F&B Outlets	International restaurant brands with ocean-facing seating	Provides economic benefit and guest variety; lacks reflection of local food heritage or culinary storytelling

Sustainability Features	Natural ventilation in lobby and select buffer landscaping	Some passive elements present; no evidence of comprehensive green building strategy such as energy efficiency, water management, or material sourcing
CRZ Compliance	Aligns with permissible CRZ norms during construction period	Legally compliant, yet raises ethical questions on coastal land development and environmental disruption
Parking & Services	Basement parking and rear service yard	Functional for operations, but drop-off zone prioritizes vehicles over pedestrian comfort and local interaction
User Experience	Seamless indoor-outdoor flow with luxury-focused spaces	Delivers high-end comfort, but the architectural identity is generic and disconnected from cultural context
Cultural Integration	Contemporary international design, devoid of local cultural reference	Absence of vernacular materials, traditional spatial systems, or regional art reflects a missed opportunity to ground the project in its geographic and cultural setting

Table 46Summary of case study

Strengths	**Limitations**
Optimal use of ocean-facing views and passive orientation	Over-dependence on the visual experience without deeper cultural or ecological grounding
Clear service and guest circulation enhancing functionality	Limited inclusivity and poor integration with public or community activities
Strategic location enhances visibility and tourist access	Exerts pressure on CRZ-sensitive land; lacks civic contribution to beach road users
Wide banquet and convention facilities contribute to urban event economy	High carbon and energy footprint; generic global aesthetics over contextual relevance
Provides luxury guest experience with high-end amenities	Minimal or no adoption of local crafts, traditions, materials, or spatial grammar

4.2 TAJ LAKEFRONT, BHOPAL, MADHYA PRADESH

AIM- To understand functioning and services behind “luxury”.

Item	Data
Name	Taj lakefront
Location	Bhopal
Developer	Indian hotel company limited (ihcl), susbidary of tata group
Area	6 acres
Year of opening	2021
Key facilities	Guest 152 rooms divided into various categories Delux room Luxury room Delux lakeview room Luxury grande lakeview Luxury suite Executive suite Presidential suite 4 bars and restaurant Spa and massage 4 indoor banquet/meeting halls 2 outdoor banquet areas Rooftop infity swimming pool Yoga and meditation centre Ayurveda centre Salon and parlours
Addl.activities and spaces	Half day tours Full day tours Wellness focused theraputic centres

4.2.1 ABOUT THE PROJECT

Taj Lakefront is a luxury 5-star hotel located along the scenic Upper Lake in Bhopal. Developed by the Indian Hotels Company Limited (IHCL), it combines modern architecture with subtle nods to Bhopal’s rich cultural heritage. With elegant lake-facing rooms, premium dining, and wellness facilities, the hotel offers a seamless blend of business and leisure, making it a landmark in the city’s hospitality landscape.

4.2.2 SITE CHARACTERISITICS

Location and Land : The site is located at Upper Lake, Bhopal.

Site Area : 6 Acres of campus with 4 Acres currently in use.

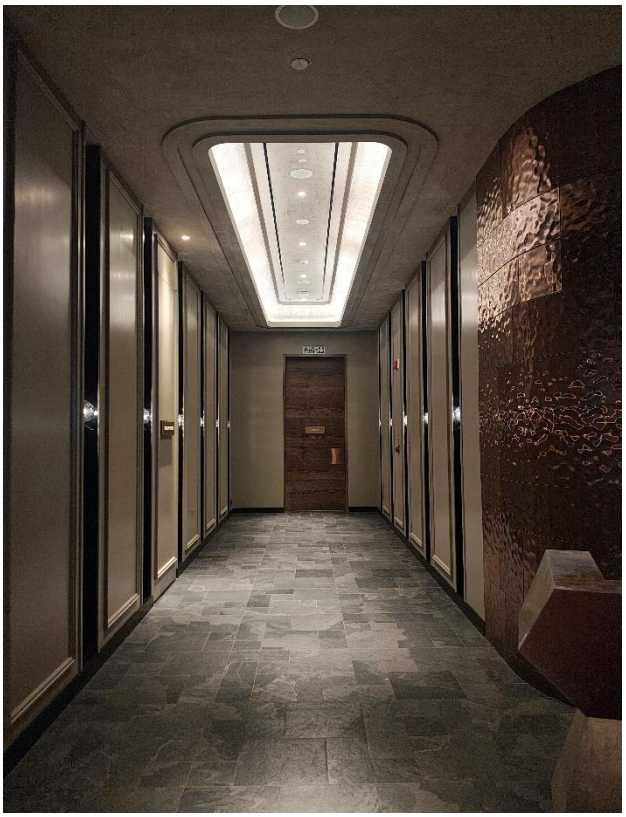
Connectivity :

Airport : 17 kms from Raja Bhoj International Airport

Railway Station : 7.2 kms from Rani Kamlapati Railway Station

Road: 1.6km from Bhadbhada Dam





Climate : Composite climate

4.2.3 ARCHITECTURAL FEATURES

Room details

- Taj Lakefront has total of 152 rooms for guests.
- Delux room 33 sqm
- Luxury Room 33 sqm
- Delux Room Lakeview 38sqm
- Luxury Grande Room 38 sqm
- Executive Suite 66 sqm
- Luxury Suite 76sqm
- Presidential suite 152sqm

Table 47 Guest room typology summary

Room Type	Area (Approx.)	Features	Remarks
Executive Suite	66 sq.m	2-room layout, lake view, interconnecting rooms	Ideal for families and high-end clientele
Twin / King Rooms	33 sq.m	Hill view, smart amenities, subtle local-European fusion interiors	Comfortable yet lacks strong regional identity
Presidential Suite	152 sq.m	Balcony in all rooms, private pantry, separate living + dining	Designed as a cultural narrative space, though interiors are largely modern

TOTAL NUMBER OF FLOORS- 13 floors

Basement floors

3 Basement floors are dedicated for parking with shared space for building services.

B3 Last floor

- Water treatment plant
- VIP Parking 100 capacity
- Composting Machine
- Chiller plant 1

B2 Second Last floor

- Parking 100 capacity
- RO Plant
- Water Softner

B1 first Basement floor

- Parking 100 Capacity
- Stocking area
- Garbage out

Backdoor operations offices

- DOE Offices
- HR Office

- Stocking Manager office
- Staff Locker room with resting area
- Staff canteen
- Staff offices
- Florist room
- House keeping

Ground floor

- Reception
- Waiting Area
- Lobby
- Vidhya Outdoor Banquet area 1000 pax
- Tapti Conference room 14 pax
- Sheesh Mahal 100 pax
- Narmada Lounge 40 pax
- Raj Mahal Banquet hall 800 pax

First Floor

- The house of ming Restaurant

Second floor

- Satpura Outdoor Banquet area 250 pax
- Machan Restaurant
- Spa, Wellness and Ayurvedic Therapeutics Area
- Gymnasium
- Yoga Centre

Service floor 1

- Electrical rooms
- Chiller plant
- HVAC rooms
- Fire systems

Third floor to tenth floor

- Guest rooms

Roof top

- Infinity Sky lounge
- Swimming Pool

Parking

- Three level Basement Parking with Capacity of 100 cars on each floor
- On Surface Two wheeler parking with capacity of 50 two wheelers

APPROCH ROAD

- 18 m wide arterial road named Link RD number 3 is connecting the Taj hotel to the various locations of the city.
- 12 m wide service lane is given in the right side of the site.

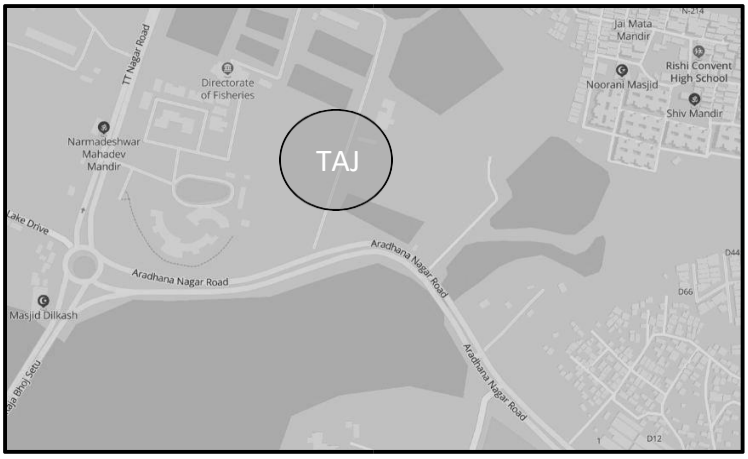


Figure 44 Approach Road

4.2.4 DESIGN PRINCIPLES

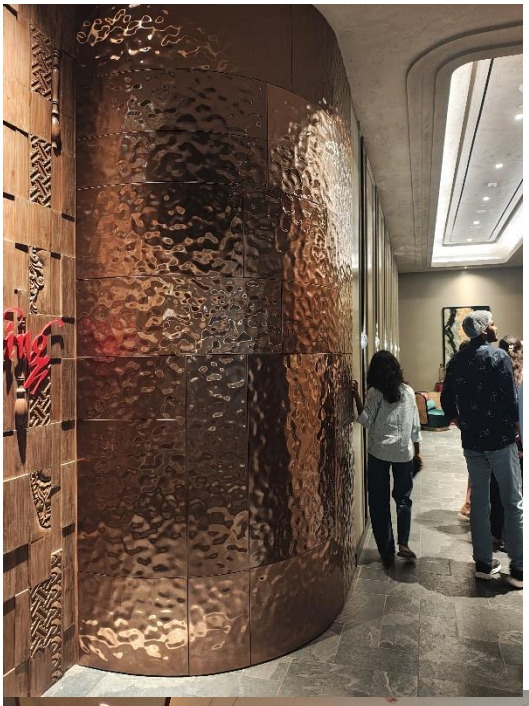
- Use of modern interior materials like glass, tiles, Metal accents
- Use of Modern upholstery like Alcantara fabric on sofas.
- Use of soft diffused lighting using cove lights, throw down lights etc.
- Warm-neutral colour scheme
- Design theme of Contemporary Indian luxe.
- Exterior follows theme of Contemporary monolithic form
- Modern premium glazing with textured plaster and use of metal and lights.

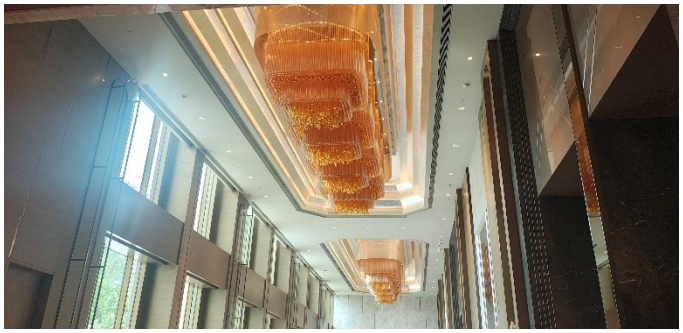
4.2.5 ENGINEERING FEATURES

- 33KV 440V Power supply steped down to 11KV 220V
- 3 D.Gs 1250KV, 1010KV AND 200KV
- Only 1250KV and 1010 KV operational.
- 200L Diesel tank
- Water through water treatment plant is reused in landscaping and cooling towers
- GRIHA Silver Rated
- Automated Building Management system installed and active.
- Composting machine produces 50 to 60 kg manure per day.
- Bottling plant currently producing 750ml bottles.

- 4 Fresh Water tanks
- STP Capacity of 350 KLD
- Rainwater Harvesting system.
- 4 Guest Elevators
- 2 fire exit staircases
- 2 Service Elevators
- 1 Service Staircase
- Car wash area
- 390 Working staff
- Motion Sensors in Toilets
- UPS Backup for 3 minutes under max load

4.2.6 PHOTO GALLERY





















Area Statement

Table 48 Area statement of taj bhopal

Name		No. of Units	Area (sq.m.)	Total Area	%
	Total No. of Keys	152			
	No. of Floors	10			
A.	**Guest Room Mix**				
	Executive Suite	141	66	9306	80
	Twin Bedroom	5	33	165	10
	King bedroom	5	33	165	10
	Presidential Suite	1	152	152	
	Total Area (Sum)			**9788**	
B.	**Guest Floor Services**				
I	**Corridor Area**				
	Type Floor Corridor	1	180	**180**	30
II	**Housekeeping Static or Typical Floors**				
	Housekeeping Static or Typical Floors	1	185	**185**	32
III	**Lifts**				
	Guest Elevators	2	55	**110**	19
	Service Lift Lobby	2	55	**110**	19
IV	**Fire Protection**				
	Fire Escape Stairs	2	30	**60**	10
	Total Area (Sum)			**585**	
C.	**Public Areas**				
I	**Entrance Lobby**				
	Port Cochere	1	40	**40**	15
	Entrance Lobby Waiting Areas Front Desk	1	100	**100**	38
	Front Desk	1	40	**40**	14
	Luggage Store	1	15	**15**	6
	Bell Man	1	4	**4**	8
II	**Business Centre**				
	Store	1	36	**36**	13
			5	**5**	2
III	**Public Utilities**				
	Public Toilet	1	30	**30**	10

Table 49 Area statement taj 2

	Total Area (Sum)			**270**	
D.	**F&B Outlets**				
	Bar (Special) - 30 Covers	1	100	**100**	25
	Multi-Cuisine Restaurant - 120 Covers	1	300	**300**	75
	Total Area (Sum)			**400**	

E.	**Banquets**				
	Banquet Hall	2	225	**450**	62
	Pre-Function Area	2	80	**160**	22
	Conference Room	1	50	**50**	6
	Banquet Toilets	1	60	**60**	10
	Total Area (Sum)			**720**	

F.	**Recreation Facilities**				
	Swimming Pool	1	100	**100**	32
	Pool Change Room	1	50	**50**	16
	Gym	1	100	**100**	32
	Massage Room	1	6	**6**	10
	Saloon	1	50	**50**	10
	Total Area (Sum)			**306**	

G.	**Retail Archade**				
	Retail Shops	1	25	**25**	
	Total Area (Sum)			**25**	
BOH					

A.	**Material Management**				
	Truck Dock	2	20	**40**	34
	Holding Area	1	38	**38**	34
	Veg Wash	1	2.5	**2.5**	2
	Purchase & Reciving Off	1	20	**20**	15
	Purchase Office Manager	1	18	**18**	15
	Total Area (Sum)			**118.5**	

B.	**Main Store**				
	General Store	1	120	**120**	75
	Linen	1	10	**10**	6

	Unassign Store	1	10	**10**	6
	Liquor	1	10	**10**	6
	Crockery	1	6	**6**	3
	Mis	1	2	**2**	2
	Fuel	1	2	**2**	2
	Total Area (Sum)			**160**	

C.	**Garbage**				
	Loading	1	20	**20**	30
	Trash Garbage(Dry)	1	8	**8**	12
	Trash Garbage Refrigerator (wet)	1	15	**15**	24
	Garbage Truck	1	12	**12**	18
	Coal Room	1	5	**5**	8
	Circulation Space	1	5	**5**	8
	Total Area (Sum)			**65**	

D.	**Front Office : Admi/Acc/IT**				
	GM	1	151	**151**	44
	Sec to GM	1	9	**9**	2
	FO Mgr Couples as duty manager)	1	5	**5**	1
	Revenue Manager	1	8	**8**	2
	Reservation Office	1	8	**8**	2
	Work Station	1	25	**25**	8
	Discussion Room (Commom Meeting)	1	4	**4**	1
	Chief Accountant- Refer Staff Reqmnt	1	15	**15**	5
	Credit Manager	1	8	**8**	2
	Cashier	1	5	**5**	1
	Controller	1	8	**8**	2
	Payroll Manager	1	5	**5**	1
	Account Record Room	1	10	**10**	2
	Meeting room	1	10	**10**	2
	Computer Room	1	17	**17**	8
	UPS	1	35	**35**	12
	Recorde	1	10	**10**	2
	Storage and Copy8ing	1	9	**9**	2
	Total Area (Sum)			**347**	

E.	**Sales**				
	Rooms Mgr	1	8	**8**	18

	Banquet Mgr	1	8	**8**	18
	Workstation	2	5	**10**	22
	Discussion Room	1	10	**10**	22
	Storage and Copying	1	8	**8**	20
	Total Area (Sum)			**44**	

F.	**F&B**				
	Multi Cuisine Main Kitchen	1	85	**85**	**20**
	Room Services Main Kitchen	1	20	**20**	5
	Pastery	1	32	**32**	7
	Bakery	1	20	**20**	4
	Commissary prep Kitchen	1	40	**40**	9
	Common Dishwash	1	20	**20**	5
	Central Potwash	1	12	**12**	2
	Pot Store	1	8	**8**	3
	Banquet BOH & Store	1	130	**130**	30
	Cold Kitchen	1	18	**18**	4
	Café Kitchen	1	12	**12**	2
	Show Kitchen\Back Pantry Area for bar	1	8	**8**	2
	Bar Counter	1	15	**15**	3
	Chief Counter	1	5	**5**	2
	Chief Office	1	8	**8**	2
	Total Area (Sum)			**433**	

G.	**House Keeping**				
	Issue / Trailer / Dirties Collection	1	5	**5**	4
	House Keeper Executive	1	10	**10**	10
	House Keeping Assistant	1	8	**8**	8
	Hsk Office + House Keeper (as per Ap.)	1	16	**16**	15
	Dead Store	1	30	**30**	28
	F&B Circulatipon	1	5	**5**	5
	Guest Supply Store	1	10	**10**	10
	Bulk Lenin Store	1	5	**5**	5
	Tailor	1	10	**10**	10
	Upholestry Store	1	5	**5**	5
	Lost & Found	1	5	**5**	5
	Total Area (Sum)			**104**	

H.	**Human Resources**				

	HR Mgr	1	8	**8**	14
	Sec	1	4	**4**	7
	Traing Room	1	20	**20**	35
	Training Mgr	1	4	**4**	7
	Discussion	1	20	**20**	35
	Total Area (Sum)			**56**	

K	**Security & Time Office**				
	Staff Entry & Time Keeper/cctv	1	10	**10**	
	Security Mgr	1	8	**8**	
	Total Area (Sum)			**18**	

L.	**Repair and Maintenance**				
	Head of Engg	1	8	**8**	
	Asst Engg	1	8	**8**	
	Secured Store	1	10	**10**	
	Paint Shope	1	10	**10**	
	Engg Store	1	10	**10**	
	Carpentry	1	10	**10**	
	Spare Parts	1	5	**5**	
	Total Area (Sum)			**61**	

J.	**Staff Facility**				
	Male Toilets & Lockers	1	100	**100**	
	Male Executive Toilets and Lockers	0	0	**0**	
	Female Toilets and Lockers	1	70	**70**	
	Kitchen	1	25	**25**	
	Staff Cafeteria	1	90	**90**	
	Staff Recreation Area	1	15	**15**	
	Total Area (Sum)			**300**	

I.	**Miscelienouis**				
	Divers Rest Room	1	15	**15**	
	Drivers Toilet	1	22	**22**	
	Microbiologist	1	8	**8**	
	Total Area (Sum)			**45**	

M.	Other BOH (exer mech)				
I	**Mechanical Areas**				
	LV Room	1	56	**56**	
	Indoor Transformers	2	22	**44**	
	LT Panel	1	74	**74**	
	DG Generator Room	1	97	**97**	
	Chiller Plant Room	1	125	**125**	
	Rainwater Tank	105 Cubic Meter			
	Municipal Tank	123 Cubic Meter			
	Raw Water Tank	123 Cubic Meter			
	Fire Tank	105 Cubic Meter			
	Treated Water Tank	123 Cubic Meter			
	Salt Storage	1	12	**12**	
	Pump Room (Fire)	1	20	**20**	
	Pump Room (Raw + Soft + WTP)	1	60	**60**	
	Boiler Room with Pump and Heat	1	58	**58**	
	STP with Pump and Equipment's	1	80	**80**	
	Work Shop	1	22	**22**	
	Engineering Office	1	8	**8**	
	Engineering Store	1	10	**10**	
	Control Room	1	15	**15**	
	Underground Oil Storage Tank	1	190	**190**	
	Swimming Pool Filtration Plant	1	12	**12**	
	Total Area (Sum)			**487**	
II	**Mechanical; Areas on Terrace**				
	Cooling Towers	1	135	**135**	
	Overhead Tank	1	12	**12**	
	Ventilation/Exhaust Fans	14	12	**168**	
	Flushing Tanks/ Cooling Tower Tanks	3	9	**27**	
	Staircase Pressurisation Fans	3	11	**33**	
	Lift Pressurisation Fans	2	2.2	**4.4**	
	Sorubber for Kitchen Exhaust	1	5	**5**	
	Total Area (Sum)		186.4	**384.4**	

N.	**Parking**				
	Basement 2			1700	
	Basement 1			1420	
	Total Wall Thiockness and Circulation			**3120**	

DESK APPRAISAL

4.3 THE LEELA PALACE, CHENNAI, TAMIL NADU

AIM- To explore how a coastal luxury hotel can seamlessly integrate traditional South Indian architectural language and cultural practices with contemporary design, creating not just a place of stay but an immersive, emotionally resonant experience rooted in local identity and context.

Table 50 Overview Leela palace

Category	**Details**
Project Name	The Leela Palace Chennai
Location	Adyar Seaface, Chennai, Tamil Nadu, India
Coordinates	13.0054° N, 80.2681° E
Year of Completion	2013
Architect	John Gerondelis (U.S.-based architect), with interior design by Jeffrey A. Wilkes
Site Area	~6.25 acres
Built-up Area	Approx. 4,44,000 sq.ft
Typology	5-Star Luxury Hotel + Banqueting/Convention Facility
Star Rating	5-Star Deluxe (Ministry of Tourism, India)
No. of Rooms/Suites	326 keys (including 20 luxury suites and a 3,500 sq.ft presidential suite)
Convention Facilities	- 12,000 sq.ft Grand Ballroom- Multiple smaller banquet halls- Pre-function spaces and waterfront lawns for outdoor events
Architecture Style	Contemporary luxury with strong inspiration from **South Indian temple architecture** (Dravidian elements)
Design Inspiration	- **Chola dynasty architecture**- Temple columns, arches, bronze finishes- Palace-like luxury ambiance
Structural System	RCC framed structure with pile foundations (suitable for coastal soil)
Façade Materials	- Beige-toned sandstone cladding- Bronze-toned decorative panels- Large arched windows and traditional **jaalis**
Roof Form	Flat roof with some dome elements on the public zone; traditional cornices and moldings
Climate Adaptation	- Designed for hot-humid tropical climate- High ceilings, cross-ventilated lobbies- Shaded verandahs and deep overhangs

Landscaping	- Sea-facing lawns- Palm-lined boulevards- Water features using temple tank design vocabulary
Cultural Integration	- **Bronze idols, Tanjore paintings, silk upholstery** from Tamil Nadu- Temple bell motifs, traditional wood carvings- In-room décor inspired by Dravidian aesthetics
Waterfront Usage	- Offers panoramic **Bay of Bengal** views- Outdoor waterfront dining and lawns- Designed with **coastal resilience**: setback from high tide, salt-resistant materials
Luxury Elements	- Ornate lobby with grand chandeliers- Exclusive club lounge- Royal dining experiences (e.g., Jamavar and Spectra restaurants)- Presidential suite with private elevator
Sustainability Features	- STP for greywater recycling- Rainwater harvesting system- Solar hot water systems- Energy-efficient lighting and HVAC- Indigenous vegetation for low water demand
Certifications	Not LEED-rated, but follows high-end sustainability and green operational practices
Notable Users/Events	Hosted global dignitaries, weddings, luxury MICE events, classical dance festivals

Overview
The city is an exciting blend of tradition and modern living.

Location
Located on the Coromandel Coast off the Bay of Bengal on the east coast of India, Chennai is the capital of Tamil Nadu and a major commercial, cultural and economic center

Places of interest
Fort St. George, Marina Beach, Santhome, Basilica, Kalakshetra, Mahabalipurm, Pondicherry. Of late, there has been a plethora of luxury brands seen entering the market, viz., Louis Vuitton, Jimmy Choo, Canali, Burberry, Omega, Cartier, Tag Heuer, Hamleys, Charles & Keith etc … depicting an emerging trend in the city



Figure 45Places of interest nearby

Table 51 Room and space details

Category	**Details**
Total Number of Rooms	326 keys (includes 295 guest rooms and 31 suites)
Standard Room – Deluxe City View	~538 sq.ft; city-facing; luxury interiors; marble bathroom, walk-in wardrobe, large windows
Grand Sea View Room	~538 sq.ft; same as Deluxe but with expansive sea views of Bay of Bengal

Executive Suite	~807 sq.ft; includes bedroom, living room, powder room, walk-in wardrobe; sea views; butler service
Premier Suite	Larger suite with living, dining area, powder room, and kitchenette; high-end finishes; sea-facing
Royal Suite (1 Bedroom)	Includes living room, dining space, king bedroom, walk-in wardrobe, powder room; lavish interiors and views
Royal Suite (2 Bedrooms)	Two-bedroom suite with dining, living, study areas; ideal for families or VIP guests
Chairman Suite	Located on top floors; includes private gym, spa, large formal dining (10 pax), lounge, kitchenette
Presidential Suite	~4,842 sq.ft; one of the largest in South India; bullet-proof features; private elevator, gym, spa, office
Ballroom – Grand	12,300 sq.ft (approx. 142' x 97', 20' high ceiling); accommodates ~1,000 guests (theatre-style)
Ballroom – Royal	6,525 sq.ft (approx. 87' x 75', 14' high ceiling); accommodates ~480 guests
Meeting Rooms	6 flexible meeting rooms and boardrooms for business, VIP, or pre-function use
Outdoor Event Spaces	Lush lawns overlooking the sea; used for weddings, performances, cultural evenings
Restaurants	- Spectra (Multi-cuisine, seafront)- Jamavar (Pan-Indian)- China XO (Contemporary Chinese)- Library Blu (Bar with sea view)
Spa & Wellness	~16,000 sq.ft ESPA-branded wellness center; includes yoga, Ayurveda, steam/sauna, spa suites
Fitness & Recreation	Infinity pool with Bay view, gym, salon, coastal jogging track
Cultural Experience	Daily lamp-lighting ritual (Theepantham), live Carnatic music, curated art displays

4.3.1 KEY TAKE AWAYS ON DESIGN

Aspect	**Insights for Vizag Project**
Architectural Language	Combine **local coastal temple architecture** (like Bheemeswara temples, Andhra stepwells) with modern geometry and luxury finishes
Climate Strategy	Use **deep overhangs, shaded outdoor lounges**, courtyards, wind corridors
Cultural Identity	Go beyond aesthetics—integrate **local crafts, dance, cuisine, and rituals** as part of experience design
Convention Design	Buffer conference areas with landscape + waterfront lawns, and integrate flexible hall design with natural daylighting

Materials	Use **weather-resistant stone, laterite, wood composites**, and copper-toned metallic finishes for coastal corrosion resilience
Waterfront Planning	Controlled access to the beach or promenade, with **view corridors** and **buffer planting zones**

PHOTO GALLERY





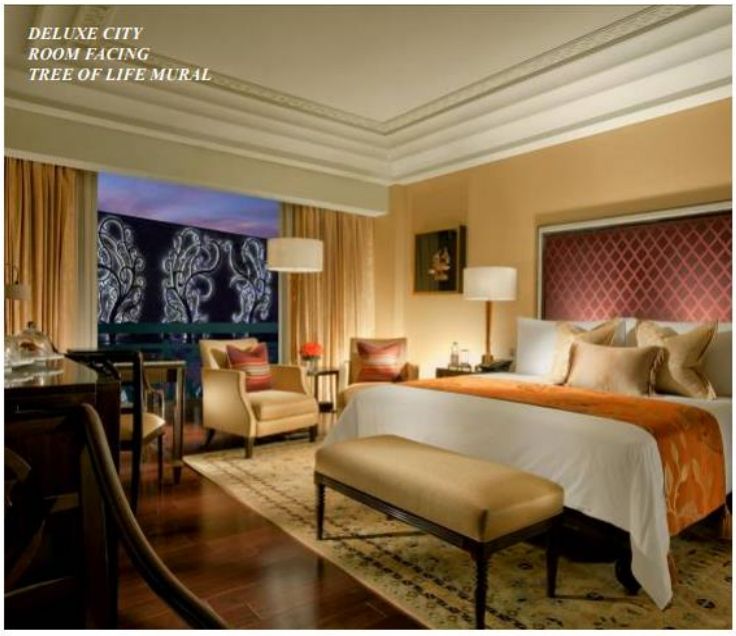











DELUXE CITY
ROOM FACING
TREE OF LIFE MURAL










EXECUTIVE SUITE






CHAIRMAN'S SUITE
DINING AREA





CHAPTER 5

CONCLUSION

Table 52 Limits in case study

Case Study	**Negative Observations**
Novotel Visakhapatnam	- Over-reliance on **balcony views** for luxury appeal- **Generic interiors** lacking strong local identity- Limited public engagement with waterfront
Taj Bhopal	- **Low flexibility** in convention spaces- Heavy aesthetic may not appeal to modern global audiences- Poor waterfront connection
The Leela Palace Chennai	- **High maintenance** luxury detailing- Limited public accessibility- Environmental sustainability not highlighted in façade/luxury perception
Vancouver Convention Centre	- Not a hotel, so lacks experiential hospitality layer- Highly **infrastructure-intensive** (1000+ piles)- **Cold material feel** to some spaces

Table 53Final take aways from case studies

Aspect	**Novotel Visakhapatnam**	**Taj Bhopal**	**Leela Palace Chennai**	**Vancouver Convention Centre West**	**Design Inference for Vizag Project**
Cultural Integration	Subtle; focuses on site view rather than immersive experience	Heritage elements with Indo-Saracenic nuances	Deep cultural engagement via rituals, materials, and art	Celebration of regional identity through wood and landform architecture	Go beyond visuals — integrate **local rituals, materials, craft traditions**, and **regional narratives** into the

					spatial design.
Sustainability Approach	Limited green strategies visible	Passive features; not strongly highlighted	Blend of luxury with passive cooling and native planting	Green roof, LEED Platinum, biodiversity, stormwater reuse	Integrate **green roofing, stormwater reuse, native landscape**, and passive ventilation suited to coastal Vizag climate.
Waterfront Integration	Direct sea-facing orientation, balconies	Not applicable	Terraces and gardens step down to the sea, elegant transition	Built over water with strong land-water connection	Emphasize **multi-level waterfront public interaction**: decks, cafes, plazas, floating pavilions.
Luxury Definition	Contemporary, corporate-friendly	Classical, regal ambiance with Indian touch	Grand, rooted in regional craft, art, and tradition	Functional luxury through material honesty and spatial clarity	Combine **material richness with functional clarity**: comfort meets local craft.
Convention/ Event Planning	Basic banquet & meeting rooms	Small-scale cultural gatherings	Large indoor-outdoor event	Large-scale modular spaces, column-	Design **flexible, modular, sea-facing**

			capacity with sea view	free halls, natural lighting	**conventio n halls** with visual connectivit y to nature.
Material Palette	Modern finishes, glass, steel	Jodhpur stone, warm earthy tones	Marble, teakwood, Chettinad details	BC wood, steel, glass, living roof	Use **coastal stones, terracotta, wood, and sustainabl e finishes** reflecting both climate and regional identity.
Public Interaction/Acce ss	More inward and guest-focused	Semi-private heritage experience	Controlled access, curated cultural participatio n	Publicly permeable, connected to urban edges and parkland	Allow **public edges with cultural zones**, evening activities, and open waterfront events accessible beyond hotel guests.
Climate Response	Moderate—glass facades with shading	Courtyard s,			

5.1 Comparitive inferences from the literature survey

Table 54 Inferences form literature survey

Norm Source	**Design Takeaways for Building Program & Spatial Planning**
Andhra Pradesh Tourism Policy 2020–25	Allocate significant built-up for **MICE facilities** (convention halls, exhibition areas); integrate **waterfront-oriented public spaces** like promenades, viewing decks, restaurants. Use **flexible, modular spaces** for events and conferences.
Developer/Brand Norms	Include zones for **luxury amenities** (spa, specialty restaurants, rooftop lounges), and **back-of-house areas** (kitchen, laundry, staff circulation) as per hotel chain requirements. Clearly segregate **guest and service circulation**.
Ministry of Tourism – HRACC (5-Star Classification)	Incorporate **minimum room sizes**, suite ratios, **multiple F&B outlets**, **banquet hall**, **swimming pool**, **spa**, and **business center**. Ensure **universal accessibility** and star-compliant safety/fire norms.
URDPFI Guidelines	Use **maximum permissible FAR** and **setbacks** effectively. Keep **utilities (STP, ETP, solid waste)** in basement or rear. Respect **zoning regulations** and provide clear access for service/maintenance.
Central Bye-Laws & IS Codes (Hotels)	Design **separate vertical and horizontal cores** for services and guests. Ensure **fire escape stairs**, water tank locations, **natural light and ventilation** in rooms and kitchens. Use **soundproofing** between banquet halls/guest areas.
CRZ Norms	Limit construction within CRZ-II with **minimum ecological impact**. Orient building blocks **parallel to coast**. Use **stilted podiums** or **elevated decks** for flood resilience. Avoid basement use in sensitive coastal zones.
Time Saver Standards	Derive **standard areas** for hotel spaces like guestrooms, lobbies, restaurants, service areas, and corridors. Maintain **ideal room-to-corridor ratios**, **lift core positioning**, and **F&B kitchen adjacency** to service areas.

5.2 BUILDING AREA PROGRAM

Table 55 Tentative building area program

Category	Spaces			Unit	Proposed Area (sq.m.)	Total Area
GUEST SPACES						
ACCOMODATION	Deluxe					
		t1	Grand Deluxe Room	120	48	5760
		t2	Barrier-free Grand Deluxe Room	10	48	480
	TOTAL			130		6240
	Executive	t3	Valley Executive Room	46	48	2208
		t4	Barrier-free Executive Room	4	48	192
	TOTAL			50		2400
	Suite	t5	Shaurya Suite	6	54	324
		t6	Veer Samudra Suite	4	54	216
		t7	Shanti Suite	6	54	324
		t8	Royal Dynasty Suite	2	90	180
		t9	Presidential Narsimha Suite	2	126	252
	TOTAL			20		1296
TOTAL				**200**		**9936**
FRONT OF HOUSE			Port Cochere	1	40	40
			Lugguage security check	1	8	8
			Reception Lobby & Grand Waiting Lounge	1	160	160
			Reception / Front Desk	1	40	40
			Concierge Desk	1	20	20
			Bell Captain Desk	1	5	5
			ATM / Currency Exchange Counter	1	5	5

		Lost & Found / Security Desk	1	5	5
		Luggage Storage Room	1	15	15
		Travel Desk / Tour Office	1	5	5
		Public washroom	1	60	60
		Guest lifts	2	10	20
		Retail Shops	1	100	100
TOTAL			**14**		**483**
RECREATION AND WELLNESS		Outdoor Swimming Pool (Main + Kids)	1	150	150
		Changing Rooms with Lockers & Toilets	1	125	125
		Support Rooms (Towel Storage, Staff Rooms)	1	25	25
		Pool Bar / Juice Bar	1	5	5
		Lifeguard Room & First Aid	1	10	10
		Spa Reception & Lounge	1	5	5
		Massage rooms	3	6	18
		Sauna & Steam Rooms	1	15	15
		Cooling room	1	20	20
		Herbal Wrap / Aroma Bath Rooms	1	20	20
		Gymnasium / Fitness Center	1	150	150

		Aerobics / Dance Studio	1	60	60
		Yoga / Meditation Pavilions	1	60	60
		Salon (Hair, Beauty, Barber)	1	60	60
		Squash	1	60	60
		Indoor Games Lounge (Snooker / TT / Billiards)	1	100	100
		Children's Play Area (Indoor & Outdoor)	1	60	60
TOTAL			**19**		**943**
BANQUET		Banquet Hall	1	360	360
		Banquet Hall	2	300	600
		Pre-Function Area	2	50	100
		Conference Room	1	150	150
		Banquet Toilets	2	30	60
TOTAL			**8**		**1270**
CONVENTION CENTRE		2500 Seating capacity			
TOTAL					**6000**
F&B		R1 @ff	2	200	400
		Multi-Cuisine Restaurant – 120 Covers	0	300	0
TOTAL			**2**		**400**
STAFF AREAS					
MATERIAL MANAGEMENT AREA PROGRAM		Truck Dock	2	20	40
		Holding Area	1	8	8
		Veg Wash	1	2	2
		Purchase & Receiving Office	1	5	5
		Purchase Office Manager	1	3.5	3.5

Total			**6**		**58.5**
MAIN STORE		General Store	1	120	120
		Linen Store	1	10	10
		Unassigned Store	1	10	10
		Liquor Store	1	10	10
		Crockery Store	1	6	6
		Miscellaneous	1	2	2
		Fuel Store	1	2	2
Total			**7**		**160**
GARBAGE		Loading Area	1	17	17
		Trash (Dry)	1	8	8
		Trash Garbage Refrigerator (Wet)	1	15	15
		Garbage Truck Parking	1	12	12
		Circulation Space	1	5	5
Total			**5**		**57**
FRONT OFFICE: ADMIN / ACCOUNTS / IT		General Manager (GM)	1	140	140
		Secretary to GM	1	9	9
		Front Office Manager (Couple, duty mgr)	1	6	6
		Revenue Manager	1	8	8
		Reservation Office	1	8	8
		Work Station (Staff)	1	25	25
		Discussion Room (Common Meeting)	1	4	4
		Chief Accountant (as per requirement)	1	15	15
		Credit Manager	1	8	8
		Cashier	1	5	5
		Controller	1	8	8
		Payroll Manager	1	5	5
		Account Record Room	1	10	10
		Meeting Room	1	10	10
		Computer Room	1	16	16
		UPS Room	1	35	35
		Records Room	1	10	10
		Storage & Copying	1	9	9
Total			**18**		**331**
SALES		Rooms Manager	1	8	8
		Banquet Mgr	1	8	8

		Discussion Room (Common Meeting)	1	10	10
		Work Station (Staff)	2	5	10
		Storage & Copying	1	8	8
Total			**6**		**44**
HOUSE KEEPING		Issue / Trailer / Dirties Collection	1	5	5
		Housekeeper Executive	1	10	10
		Housekeeping Assistant	1	8	8
		Hsk Office + Housekeeper	1	16	16
		Dead Store	1	30	30
		F&B Circulation	1	5	5
		Guest Supply Store	1	10	10
		Bulk Linen Store	1	5	5
		Tailor	1	10	10
		Upholstery Store	1	5	5
		Lost & Found	1	5	5
Total			**11**		**109**
F&B (FOOD & BEVERAGES)		Multi Cuisine Main Kitchen	1	85	85
		Room Services Main Kitchen	1	20	20
		Pastry	1	32	32
		Bakery	1	20	20
		Store room	1	13	13
		Commissary Prep Kitchen	1	40	40
		Common Dishwash	1	20	20
		Central Potwash	1	14	14
		Pot Store	1	12	12
		Banquet BOH & Store	2	30	60
		Cold Kitchen	1	16	16
		Café Kitchen	1	12	12
		Show Kitchen / Back Pantry Area for Bar	1	18	18
		Bar Counter	1	15	15
		Chief Counter	1	8	8
		Chief Office	1	8	8
Total			**17**		**393**
HUMAN RESOURCES		HR Mgr	1	8	8
		Secretary to HR	1	4	4

		Training Room	1	18	18
		Training Mgr	1	4	4
		Discussion Room (Common Meeting)	1	9	9
Total			**5**		**43**
SECURITY & TIME OFFICE		Staff Entry & Time Keeper / CCTV	1	10	10
		Security Manager	1	8	8
Total			**2**		**18**
REPAIRS AND MAINTAINANCE		Head of Engineering	1	10	10
		Assistant Engineer	1	10	10
		Secured Store	1	10	10
		Paint Shop	1	5	5
		Engineering Store	1	10	10
		Carpentry	1	10	10
		Spare Parts	1	5	5
Total			**7**		**60**
STAFF FACILITY		Male Toilets & Lockers	1	60	60
		Male Executive Toilets and Lockers	1	0	0
		Female Toilets and Lockers	1	60	60
		Kitchen	1	25	25
		Staff Cafeteria	1	90	90
		Staff Recreation Area	1	15	15
Total			**6**		**250**
MISCELLENEOUS		Drivers Rest Room	1	15	15
		Drivers Toilet	1	22	22
		Microbiologist	1	8	8
Total			**3**		**45**
OTHERS (EXT)		LV Room	1	56	56
		Indoor Transformers	2	20	40
		LT Panel	1	75	75
		DG Generator Room	1	100	100
		Chiller Plant Room	1	125	125
		Rainwater Tank	1	0	0
		Municipal Tank	1	0	0
		Raw Water Tank	1	0	0
		Fire Tank	1	0	0
		Treated Water Tank	1	0	0
		Salt Storage	1	12	12

		Pump Room (Fire)	1	20	20
		Pump Room (Raw + Soft + WTP)	1	60	60
		Boiler Room with Pump & Heat	1	80	80
		STP with Pump & Equipment	1	80	80
		Workshop	1	20	20
		Engineering Office	1	30	30
		Engineering Store	1	15	15
		Control Room	1	10	10
		Underground Oil Storage Tank	1	190	190
		Swimming Pool Filtration Plant	1	36	36
Total			**22**		**949**
MECHANICAL AREAS ON TERRACE		Cooling Towers	1	135	135
		Overhead Tank	1	12	12
		Ventilation/Exhaust Fans	12	14	168
		Flushing Tanks/Cooling Tower Tks	3	9	27
		Staircase Pressurisation Fans	2	17	34
		Lift Pressurisation Fans	2	22	44
		Scrubber for Kitchen Exhaust	1	5	5
Total			**22**		**425**
PARKING		Basement 2	1	0	0
		Basement 1	1	0	0
Total			**2**		**0**
TOTAL BUILTUP					22193
					5548
			27741.3		

TOTAL TENTATIVE BUILT-UP AREA – 36000-40000 sqm

CHAPTER 6

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01 SITE ANALYSIS

INTRODUCTION

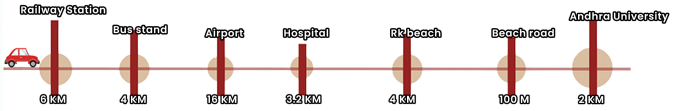


Name of the project: Proposed 5 Star Hotel with convention centre.

Location: Along beach road, Vishakhapatnam, Andhra Pradesh India.

Site Coordinates: 17°43'22.65"N 83°20'24.48"E.

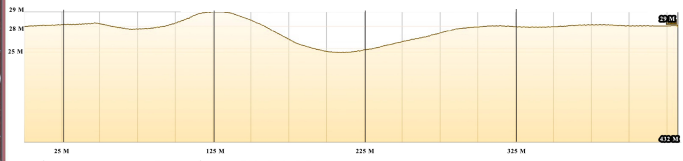
Proposing Authority: VMRDA



PROJECT DETAILS

S.No.	DESCRIPTION	PROPOSED
1.	SITE AREA (SQM)	43625.112
2.	SITE AREA (ACRE)	10.78
3.	GROUND COVERAGE	30%
4.	F.A.R.	2.5
5.	MAX BUILTUP AREA (SQM)	109,062.78
6.	MOS	10 M
7.	BUILDING HEIGHT	UPTO 40 M
8.	LAND USE	MIXED USE TYPE 3
9.	CRZ	II
10.	SEISMIC ZONE	II
11.	HORIZONTAL CLEARENCE OF HTL	2.5 KM
12.	PARKING PERCENTAGE	30%

SITE SECTION



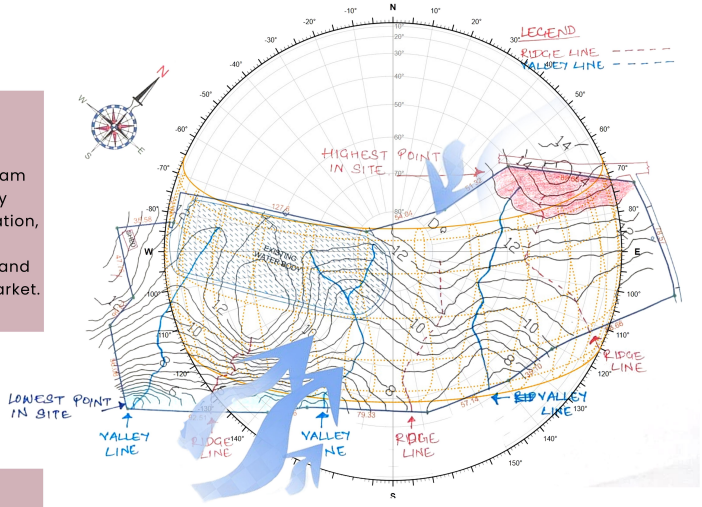
Min. Avg. Max Elevation : 25, 27, 29 m
Distance: 432 m
Elev Gain/Loss : 9.02 m, -8.92 m
Max Slope: 9.4%, -14.4%
Avg Slope: 2.6% , -3.3%

SITE SECTION



Min. Avg. Max Elevation : 15, 22, 29 m
Distance: 294 m
Elev Gain/Loss : 14.2 m, -0.13 m
Max Slope: 28.9% , -1.0%
Avg Slope: 5.4% , -0.2%

CLIMATIC ANALYSIS



Annual Avg. Temperature: 27.2°C
Hottest Month (May): 30.0°C; **Coolest Month** (Jan): 23.9°C
Humidity: 80% (Morning), 70% (Evening)
Annual Rainfall: 1,118.8mm
Prevailing Winds: SW (Monsoon), NE (Winter)
Stormwater: Southwest & Northeast monsoon seasons

S

Prime beachfront in Visakhapatnam offering Bay of Bengal views, easy transport access, cultural integration, and a blend of affordability and luxury, appealing to both leisure and business tourists in a growing market.

O

Rising Andhra tourism post-COVID, attracting young professionals and families; beachfront suits leisure, MICE, eco-tourism, cruise tie-ins, and cultural tourism linked to heritage sites and festivals.

W

Balancing affordability with luxury needs cost control; high beachfront costs strain budgets; poor execution risks mid-tier image; limited urban beachfront space restricts expansion.

T

Seasonal tourist dips, strong competition, CRZ restrictions, climate risks, and economic slowdowns challenge profitability and operations in Visakhapatnam's beachfront hospitality market.

SITE PHOTOGRAPHS AND ACCESSIBILITY



This "City of Destiny" offers a unique blend of industrial vitality, a growing MICE (Meetings, Incentives, Conferences, and Exhibitions) market, and stunning coastal beauty, presenting a clear opportunity for a high-end hospitality and event hub.



Urban arterial– Beach Road 45 m wide
Sub arterials- 30m wide
Local Streets- up to 15 m

EXISTING VEGETATION

TOP STORY


ARTOCARPUS HETEROPHYLLUS LAM


COCOS NUCIFERA

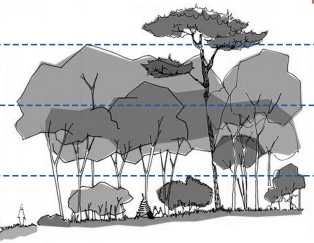

CASUARINA EQUISETIFOLIA


STERCULIA URENS ROXB

MIDDLE STORY


SARACA ASOCA


WRIGHTIA TINCTORIA



Vis
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LOWER STORY


DURANTA ERECTA


DYPSIS LUTESCENS

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Prepared By: SHREYA MAHULE I 211110015

02 CONCEPT *Affordable Luxury*

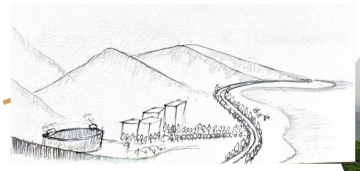


TRANSITION OF LANDSCAPES



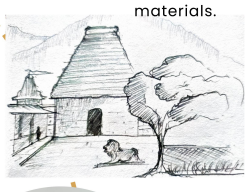
1 Drawing inspiration from **James Taitz's** principles of placemaking, narrative-driven spaces, and sensory engagement, this hotel redefines the coastal hospitality experience in Vizag. It addresses three core challenges:



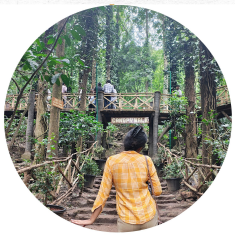




2 **Beyond the Window View** – The design weaves Vizag's cultural, historical, and ecological identity into every space through immersive narratives, interactive zones, and locally rooted materials.







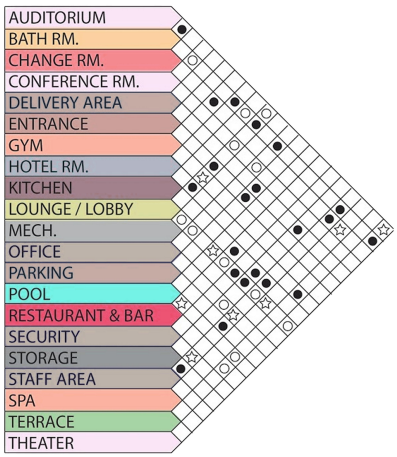


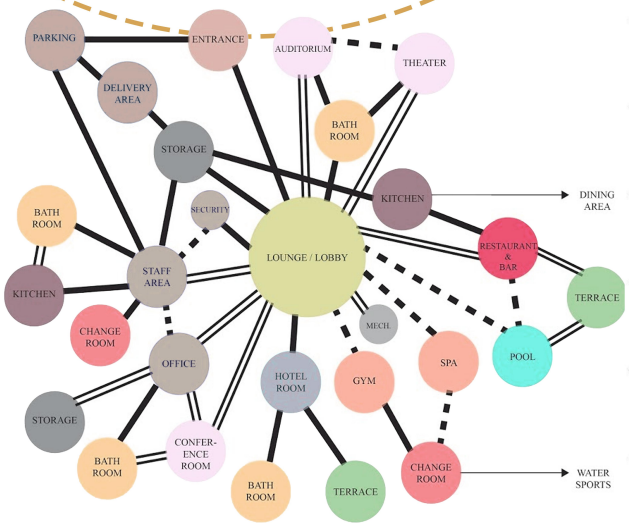


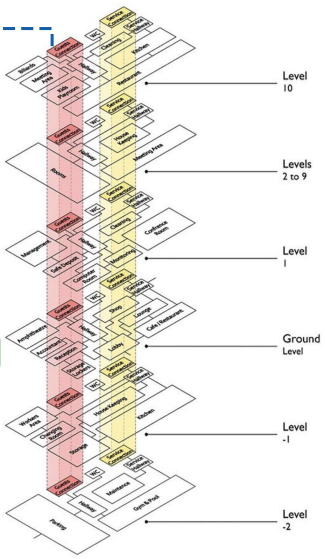
3 **Affordability,** in this context, extends beyond room tariffs to include publicly accessible spaces where students, researchers, and locals can engage with the hotel for learning, cultural exchange, or simple recreation—integrating the property as an inclusive urban asset rather than an exclusive luxury enclave.

4 **Sustainability** as a living practice, blending coastal vernacular, renewables, water recycling, and local techniques for comfort and responsibility.

ZOINING







SURROUNDING PLACES









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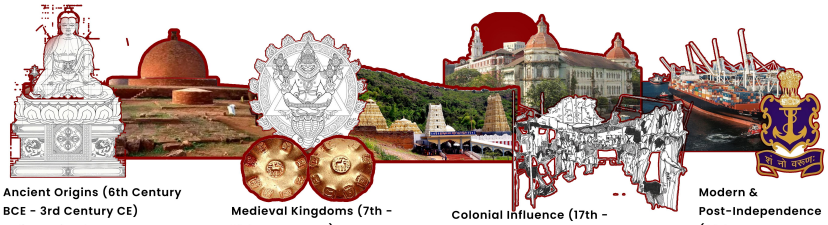
02 INFERENCES *From case study and simulations*

HISTORICAL VALUE

1. Mentions in ancient texts (Pānini, Katyayana). Flourishing Buddhist centers (Thotlakonda, Bavikonda, Bojjannakonda). Evidence of trade with Rome and Middle East.
2. Development of temples, trade routes, and maritime activity. Fortified mercantile town managed by a guild (12th Century AD).
3. European settlements established (East India Company in 1682). Strategic port development by British. Waltair becomes significant European residential area. 1780 Sepoy Mutiny.
4. Emergence as major industrial hub (Hindustan Shipyard, Visakhapatnam Steel Plant). Headquarters of Eastern Naval Command. "Shipbuilding capital of India." Selection as Smart City; proposed executive capital. Major tourist destination.



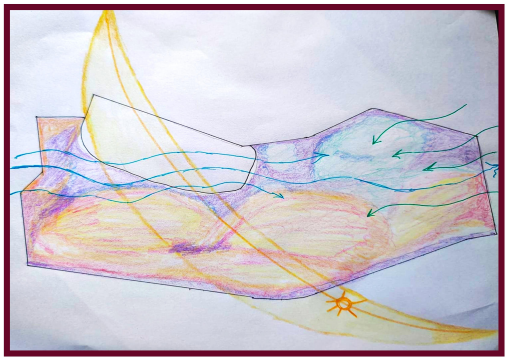
Ancient Origins (6th Century BCE - 3rd Century CE)
Kalinga Kingdom, Mauryan Empire (Ashoka), Satavahanas, Buddhist Influence

Medieval Kingdoms (7th - 16th Century CE)
Eastern Chalukyas, Vengi Kingdom, Pallava, Eastern Ganga, Chola Dynasty, Gajapati Kingdom, Reddi Kingdom, Vijayanagara Empire

Colonial Influence (17th - 19th Century CE)
Dutch, English East India Company, French, British

Modern & Post-Independence (20th Century - Present)
Indian Government

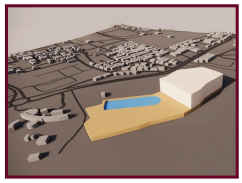
SITE CONTEXT



Due to wind flow from SW to NE and existing vegetation of thick trees , the average surface temperature of site.

DESIGN INFERENCES FROM CASE STUDY

Aspect	Novotel Visakhapatnam	Taj Bhopal	Leela Palace Chennai	Vancouver Convention Centre West	Design Inference for Vizag Project
Cultural Integration	Subtle; focuses on site view rather than immersive experience	Heritage elements with Indo-Saracenic nuances	Deep cultural engagement via rituals, materials, and art	Celebration of regional identity through wood and landform architecture	Go beyond visuals — integrate local rituals, materials, craft traditions, and regional narratives into the spatial design.
Sustainability Approach	Limited green strategies visible	Passive features; not strongly highlighted	Blend of luxury with passive cooling and native planting	Green roof, LEED Platinum, biodiversity, stormwater reuse	Integrate green roofing, stormwater reuse, native landscape, and passive ventilation suited to coastal Vizag climate.
Waterfront Integration	Direct sea-facing orientation, balconies	Not applicable	Terraces and gardens step down to the sea, elegant transition	Built over water with strong land-water connection	Emphasize multi-level waterfront public interaction: decks, cafes, plazas, floating pavilions.
Luxury Definition	Contemporary, corporate-friendly	Classical, regal ambiance with Indian touch	Grand, rooted in regional craft, art, and tradition	Functional luxury through material honesty and spatial clarity	Combine material richness with functional clarity: comfort meets local craft.
Convention/ Event Planning	Basic banquet & meeting rooms	Small-scale cultural gatherings	Large indoor-outdoor event capacity with sea view	Large-scale modular spaces, column-free halls, natural lighting	Design flexible, modular, sea-facing convention halls with visual connectivity to nature.
Material Palette	Modern finishes, glass, steel	Jodhpur stone, warm earthy tones	Marble, teakwood, Chettinad details	BC wood, steel, glass, living roof	Use coastal stones, terracotta, wood, and sustainable finishes reflecting both climate and regional identity.
Public Interaction/Access	More inward and guest-focused	Semi-private heritage experience	Controlled access, curated cultural participation	Publicly permeable, connected to urban edges and parkland	Allow public edges with cultural zones, evening activities, and open waterfront events accessible beyond hotel guests.
Climate Response	Moderate—glass facades with shading	Courtyards, verandas	Shaded colonnades, water bodies, garden buffers	Sloping roofs, green decks, sunlight optimization	Employ shaded verandahs, breezeways, water elements, and green roofs for thermal comfort in coastal sun and humidity.
Form & Massing	Vertical tower blocks	Horizontal stepped built form	Layered palace-inspired façade with horizontal emphasis	Horizontal, landform-style green-roof structure	Favor horizontal zoning with stepped terraces blending into landscape and sea horizon.
Experiential Quality	Functional, sea views, corporate	Nostalgic, heritage, calm	Regal, immersive, sensory	Transparent, open, ecologically expressive	Design spaces that evoke emotion — soundscapes, smell (flowers/spices), light play, cultural performance zones.

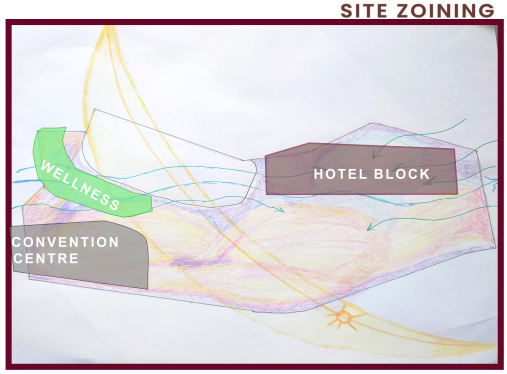


Permissible ground coverage and permissible height of block on site.



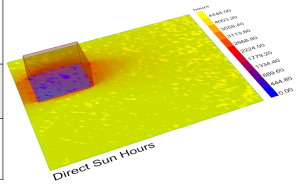
MOS of 10 m from all sides.

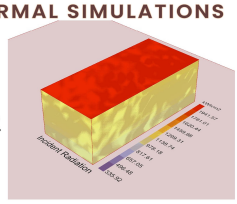
SITE ZOINING



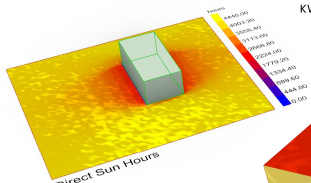
THERMAL SIMULATIONS

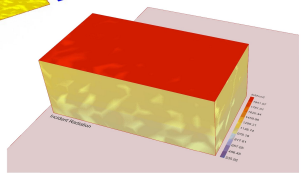
Total hours of direct sun radiation





Amount of radiation on surface in KWH



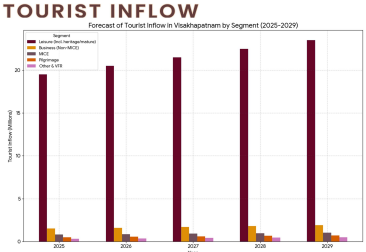


NEGATIVES

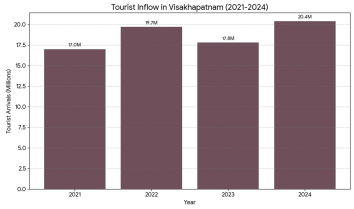
Case Study	Negative Observations
Novotel Visakhapatnam	Over-reliance on balcony views for luxury appeal
	Generic interiors lacking strong local identity
	Limited public engagement with waterfront
Taj Bhopal	Low flexibility in convention spaces
	Poor waterfront connection
The Leela Palace Chennai	High maintenance luxury detailing
	Limited public accessibility
	Environmental sustainability not highlighted in façade/luxury perception
Vancouver Convention Centre	Highly infrastructure-intensive (1000+ piles)
	Cold material feel to some spaces



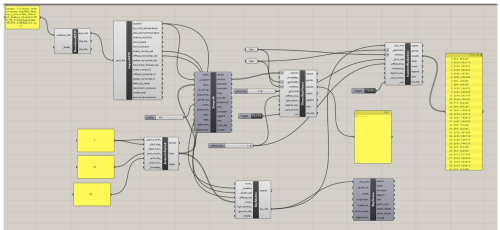
TOURIST INFLOW



Vishakapatnam has seen 14.61% increase in tourist inflow from 2023 and 3.55% increase from 2022. Majority of tourist inflow was for Eco-toursim and M.I.C.E events.



Vishakapatnam is expected to have inflow of 25 million tourist by 2029. Leisure, business and mice would make up for more than 90% of total tourist inflow.



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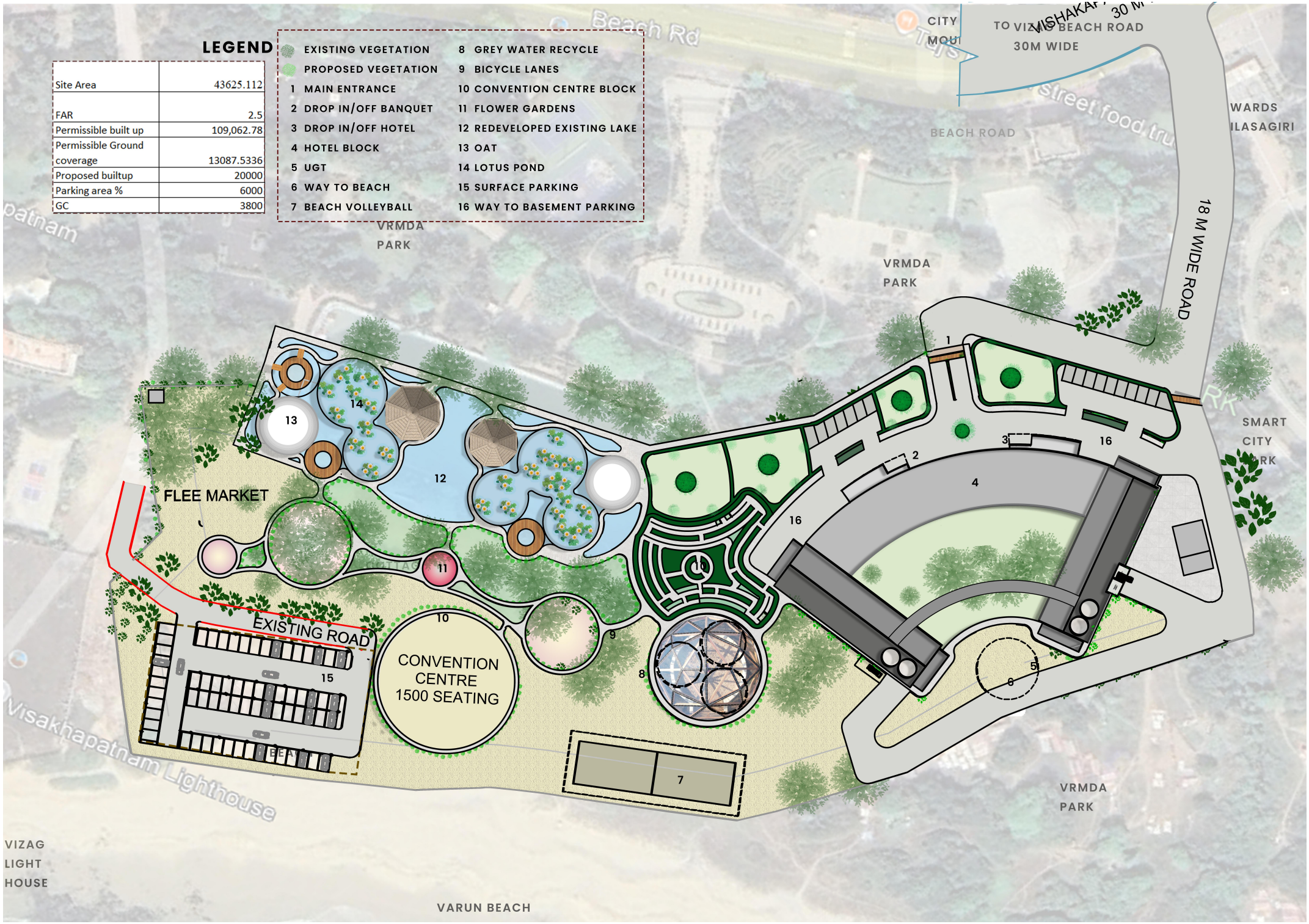
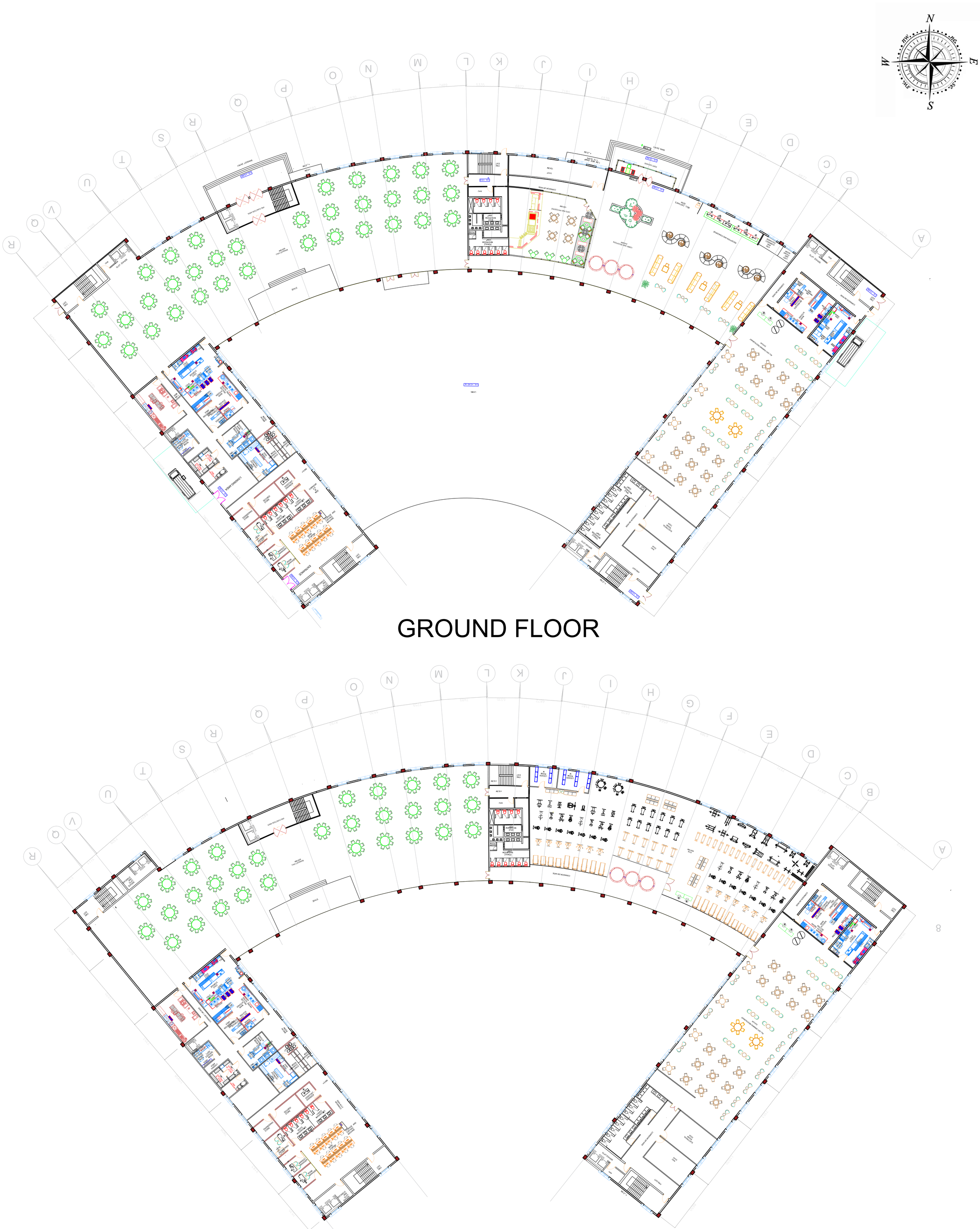
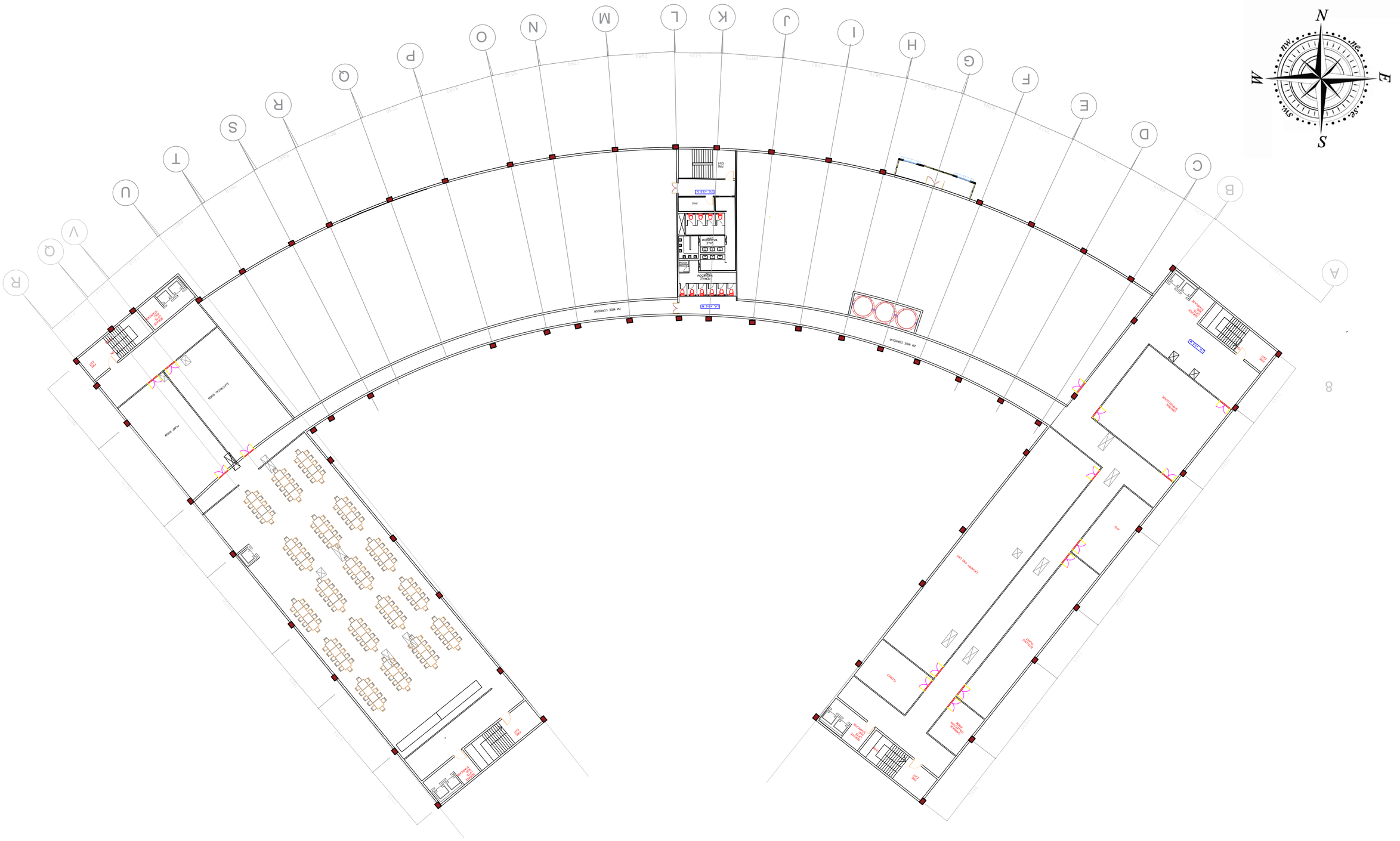

LEGEND
EXISTING VEGETATION
PROPOSED VEGETATION
1 MAIN ENTRANCE
2 DROP IN/OFF BANQUET
3 DROP IN/OFF HOTEL
4 HOTEL BLOCK
5 UGT
6 WAY TO BEACH
7 BEACH VOLLEYBALL
8 GREY WATER RECYCLE
9 BICYCLE LANES
10 CONVENTION CENTRE BLOCK
11 FLOWER GARDENS
12 REDEVELOPED EXISTING LAKE
13 OAT
14 LOTUS POND
15 SURFACE PARKING
16 WAY TO BASEMENT PARKING
Site Area 43625.112
FAR 2.5
Permissible built up 109,062.78
Permissible Ground coverage 13087.5336
Proposed builtup 20000
Parking area % 6000
GC 3800
FLEE MARKET
EXISTING ROAD
CONVENTION CENTRE 1500 SEATING
18 M WIDE ROAD
TO VIZAG BEACH ROAD
30M WIDE
BEACH ROAD
VRMDA PARK
SMART CITY
VISAKHAPATNAM LIGHTHOUSE
VIZAG LIGHT HOUSE
VARUN BEACH

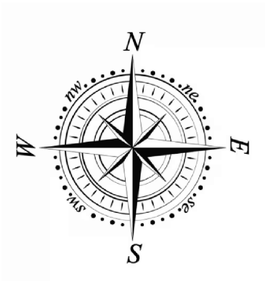


SCALE 1:200	FINAL REVIEW	FLOOR PLANS	SHREYA MAHULE 211110015 5TH YEAR THESIS FINAL REVIEW	SIGNATURE



SCALE 1:200	FINAL REVIEW	FLOOR PLANS	SHREYA MAHULE 211110015 5TH YEAR THESIS FINAL REVIEW	SIGNATURE

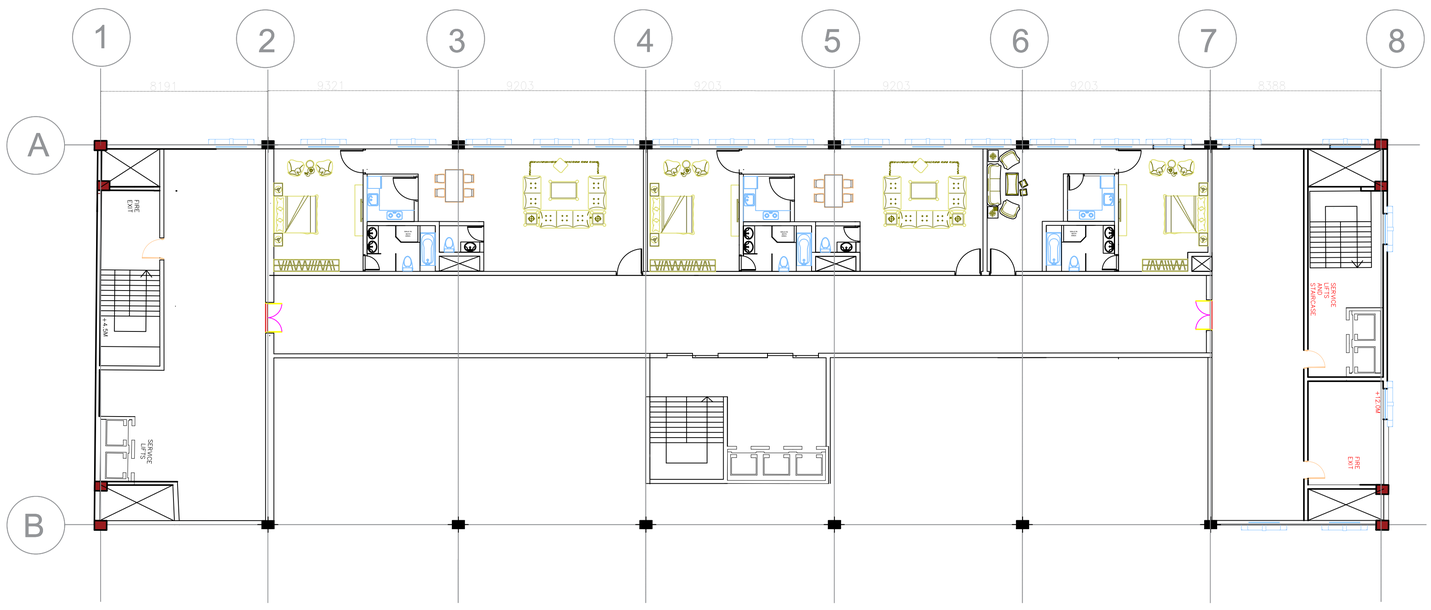




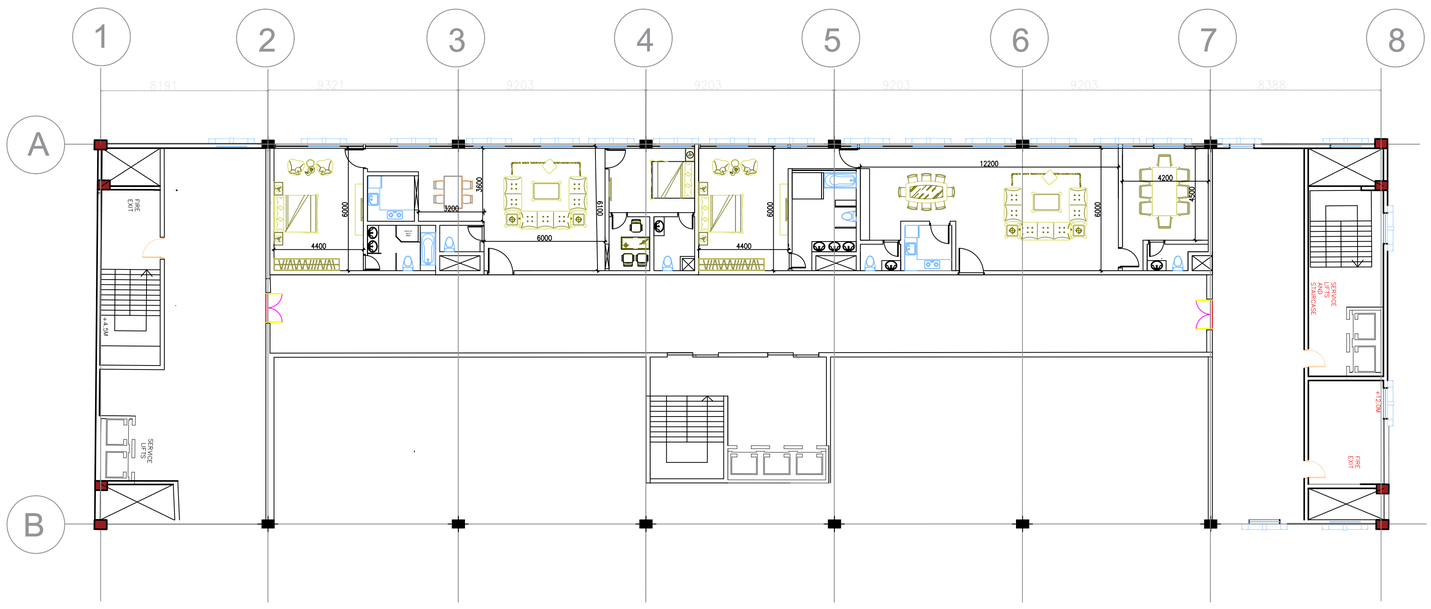
EXECUTIVE ROOMS



SHAURYA, VEER, SHANTI SUITE

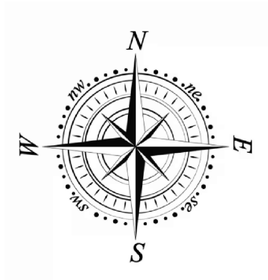


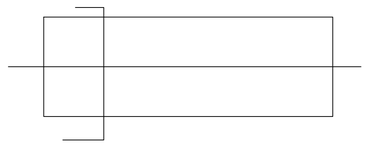
ROYAL SUITES

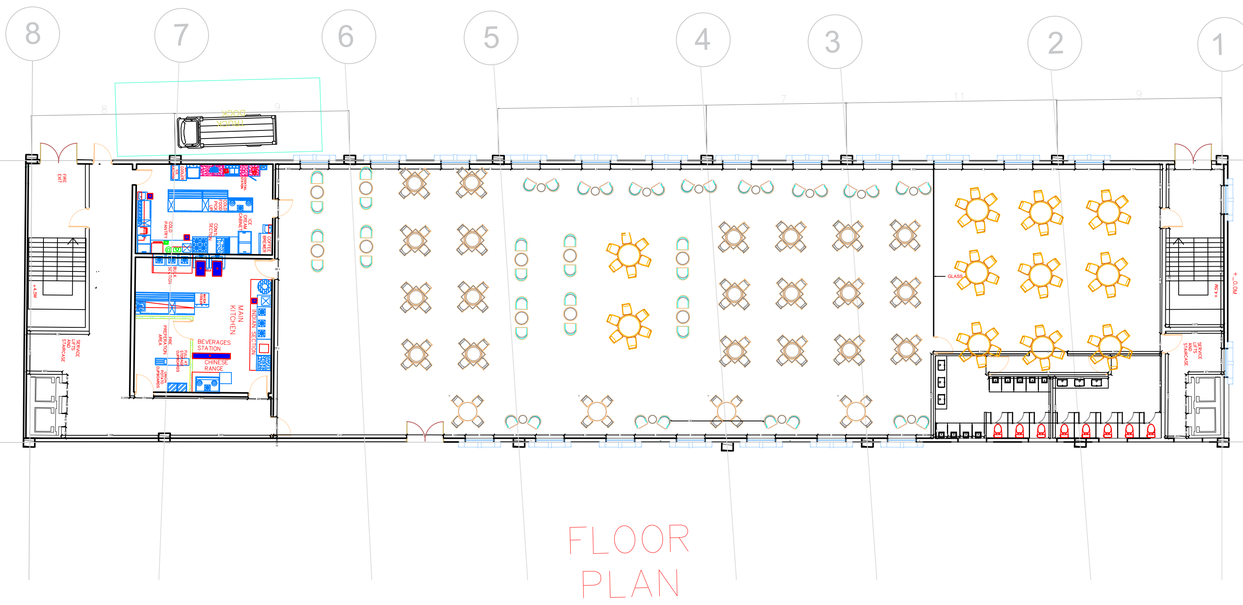


NARSIMHA SUITES

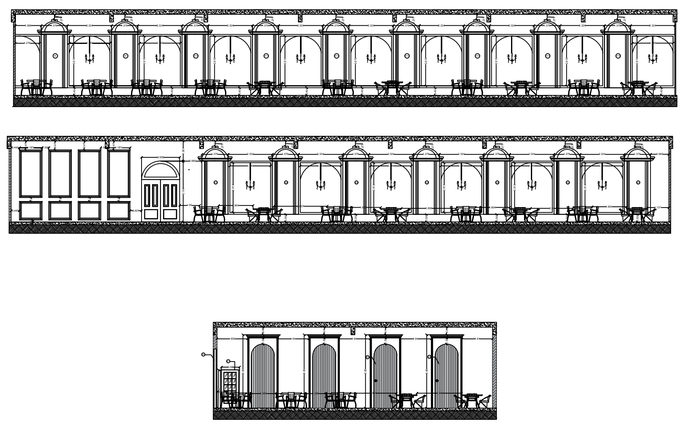
SCALE 1:200	FINAL REVIEW	ROOM TYPICAL FLOOR LAYOUTS	SHREYA MAHULE 211110015 5TH YEAR THESIS FINAL REVIEW	SIGNATURE



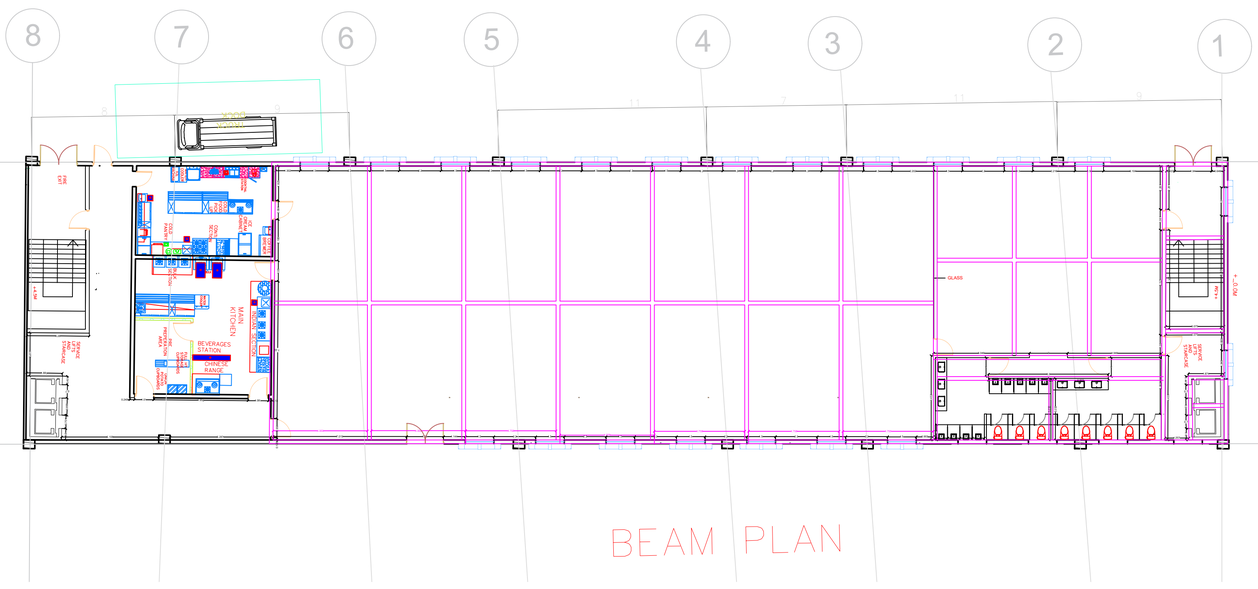




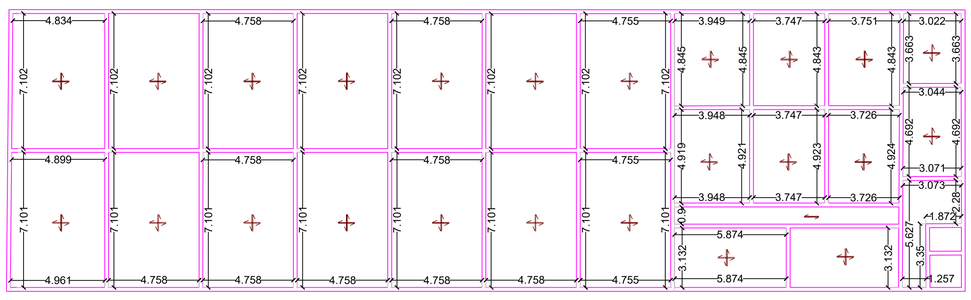
FLOOR PLAN



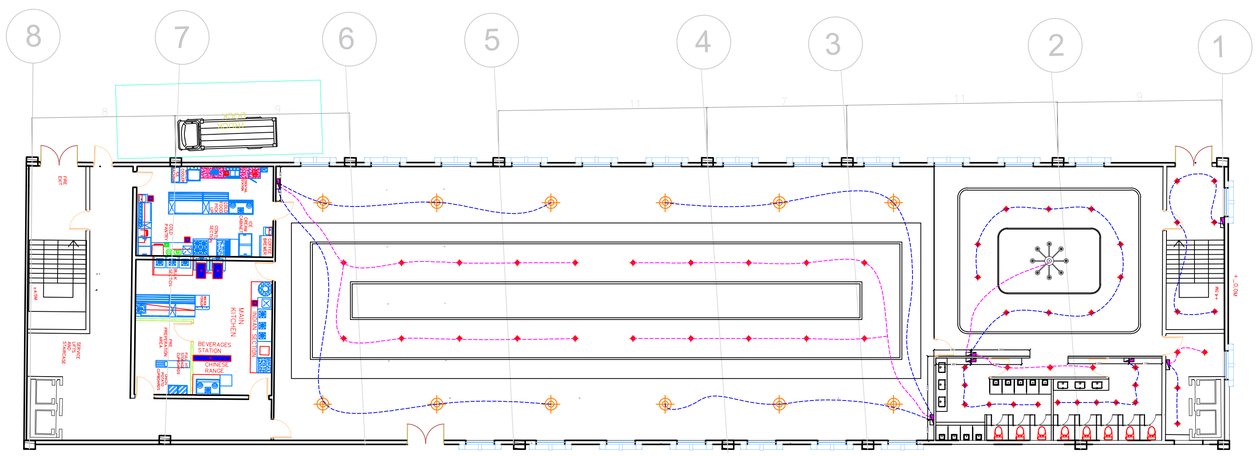
WALL ELEVATION



BEAM PLAN

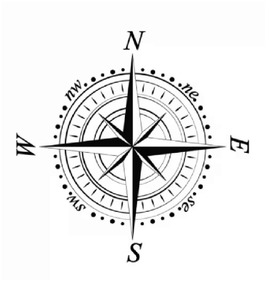


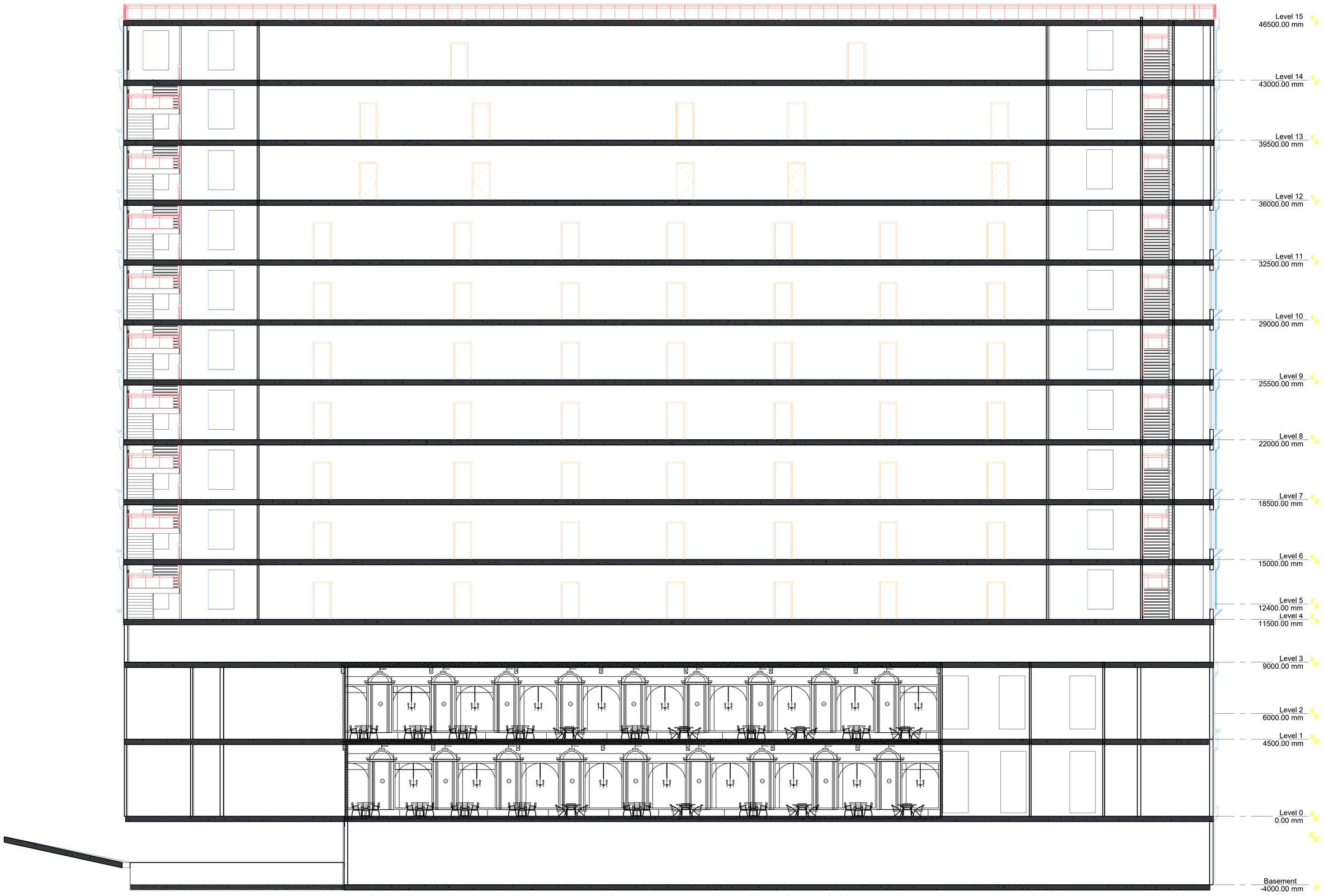
SLAB PLAN



ELECTRICAL PLAN

	FINAL REVIEW	WORKING DRAWING (RESTAURANT)	SHREYA MAHULE 211110015 5TH YEAR THESIS FINAL REVIEW	SIGNATURE





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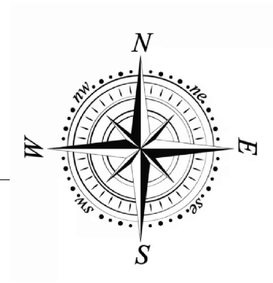
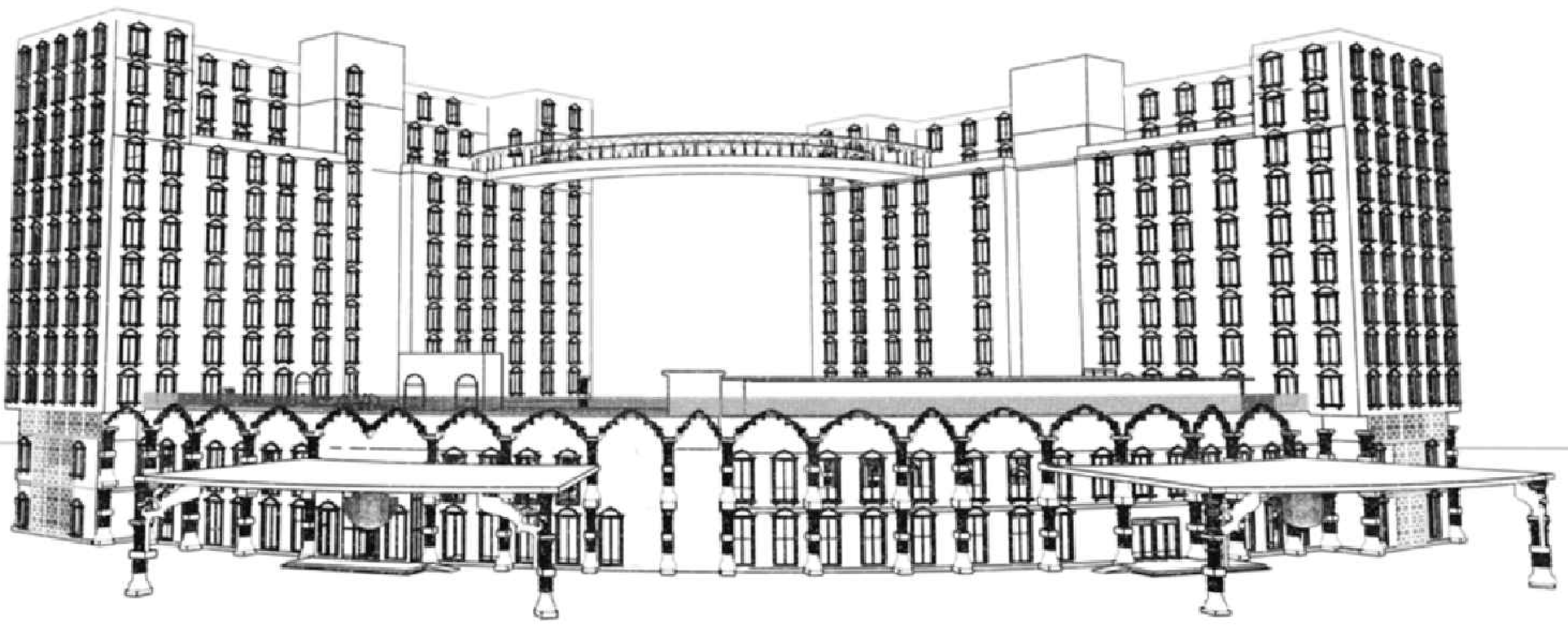




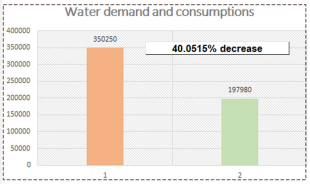


	FINAL REVIEW	3D VIEWS	SHREYA MAHULE 211110015 5TH YEAR THESIS FINAL REVIEW	SIGNATURE

01 WATER PERFORMANCE

WATER DEMAND

BASE CASE					
SNO.	TYPOLOGY OF USE	NO. OF USERS	LPCD	TOTAL DEMAND IN L/D	REMARKS
1	OFFICE	80	45	3600	1 person per 10 sqm of floor area
2	HOTEL ROOM	800	320	256000	excluding laundry, kitchen, staff and water bodies
3	HOTEL STAFF	550	45	24750	staff to room ratio= 2.75:1
4	RESTAURANT	120	70	8400	including water requirement for kitchen.
5	CONVENTION CENTRE	2500	15	37500	Cinemas, concert halls and theatres and multiplex
6	LANDSCAPE	2500	8	20000	
	TOTAL			350250	



Baseline demand (NBC) – 320 LPCD for hotel rooms, 45 LPCD for offices, 70 LPCD for restaurants, 15 LPCD for convention halls, and 8 LPCD for landscape.
The proposed case achieves a 40% reduction using:

Low-flow fixtures – showerheads, aerators, metered taps, and dual-flush WCs.

Bio-toilets and aerator-based flushing systems minimizing water per use.

Sensor taps, efficient dishwashers, and reuse of rinse water in kitchens.

Drip irrigation, native planting, and soil moisture sensors for landscape efficiency.
These integrated methods collectively reduce overall demand while maintaining comfort and performance across all functions.

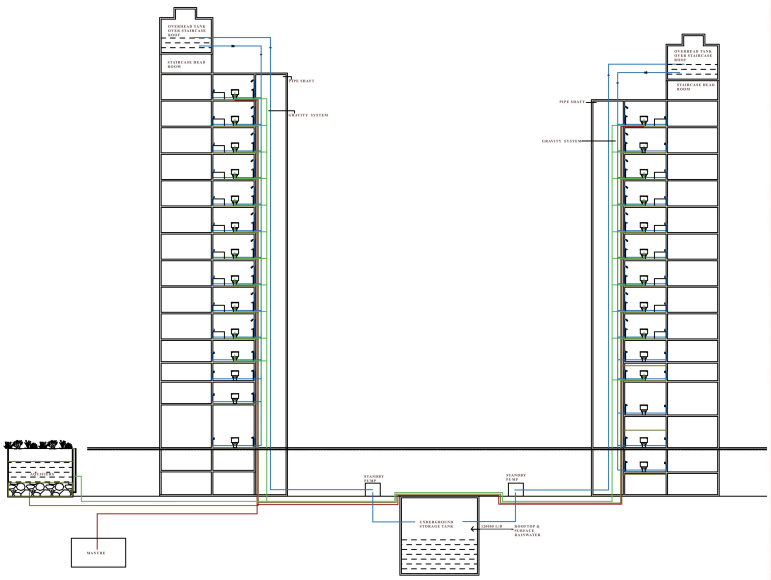






PROPOSED CASE					
SNO.	TYPOLOGY OF USE	NO. OF USERS	LPCD	TOTAL DEMAND IN L/D	REMARKS
1	OFFICE	80	24	1920	1 person per 10 sqm of floor area
2	HOTEL ROOM	800	200	160000	excluding laundry, kitchen, staff and water bodies
3	HOTEL STAFF	350	24	8400	staff to room ratio=1.75:1
4	RESTAURANT	120	43	5160	Restaurants as per no. of seat including water requirement for kitchen.
5	CONVENTION CENTRE	2500	9	22500	Cinemas, concert halls and theatres and multiplex
6	LANDSCAPE		3.4		
	TOTAL			197980	

TYPICAL SECTION



Self-sustaining system: Operates with minimal mechanical energy using gravity and solar-assisted circulation.

Visual and sensory appeal: The planted bed contributes to the biophilic experience inside the greenhouse, enhancing air quality and visual calmness.

Educational value: Demonstrates a nature-based solution for urban water management and can serve as an interactive exhibit within the greenhouse.

Climate suitability: The system adapts well to Vizag's tropical rainfall pattern, allowing seasonal water storage and reuse.

Soil and groundwater protection: HDPE lining and controlled flow prevent contamination of surrounding soil layers.

Circular use of resources: The treated water supports irrigation and flushing, reducing dependence on municipal supply.

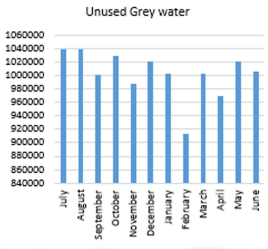
WATER HARVEST

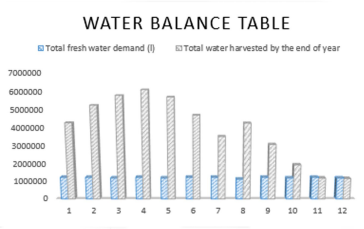
Water harvesting Sources	Area	Runoff coeff
Roof Surfaces	8000	0.85
Hardscape areas	6000	0.7
Softscape areas	3000	0.01
Effective catchment area	**11030**	

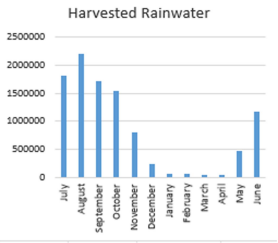
WATER CONSUMPTION

Water consumption point	Quantity	Liters/day
Occupants : {People x l/person}	200	199
Irrigation (max) : {m²x l/m²}	1000	1.5
Cooling tower (max) : {Ton x l/Ton}	0	0

RAIN WATER HARVESTING







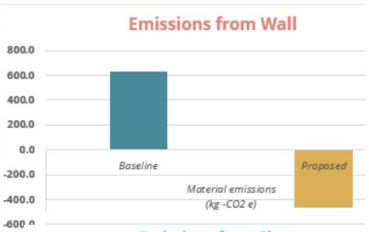
Month	Days in month	Rainfall (mm)	Effective rain (mm)	Harvested water (l)	Municipality water supply (l)	Primary demand (l)	Grey water generated (l)	Irrigation seasonal factor (%)	Irrigation Water demand (l)	Irrigation fresh water demand (l)	Unused grey water (l)	Cooling tower Ussage factor (%)	Cooling tower water demand (l)	Total fresh water demand (l)	Storage (l)	Total water harvested by the end of year
July	31	190	185	1804675	3720000	1233800	1048730	20%	9300	0	1039430	0%	0	1233800	90000	4290875
August	31	230	225	2194875	0	1233800	1048730	20%	9300	0	1039430	0%	0	1233800	90000	5251950
September	30	182	177	1726635	0	1194000	1014900	30%	13500	0	1001400	0%	0	1194000	90000	5784585
October	31	163	158	1541290	0	1233800	1048730	40%	18600	0	1030130	0%	0	1233800	90000	6092075
November	30	87	82	799910	0	1194000	1014900	60%	27000	0	987900	0%	0	1194000	-304090	5697985
December	31	30	25	243875	0	1233800	1048730	60%	27900	0	1020830	0%	0	1233800	-1294015	4708060
January	31	11	6	58530	0	1233800	1048730	100%	46500	0	1002230	0%	0	1233800	-2469285	3532790
February	28	12	7	68285	1800000	1124350	955697.5	100%	42375	0	913322.5	0%	0	1124350	-1725350	4276725
March	31	10	5	48775	0	1233800	1048730	100%	46500	0	1002230	0%	0	1233800	-2910375	3091700
April	30	10	5	48775	0	1194000	1014900	100%	45000	0	969900	0%	0	1194000	-4055600	1946475
May	31	54	49	477995	0	1233800	1048730	60%	27900	0	1020830	0%	0	1233800	-4811405	1190670
June	30	125	120	1170600	0	1194000	1014900	20%	9000	0	1005900	0%	0	1194000	-4834805	1167270
															90000	47031160

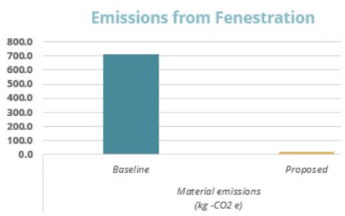
Month	Days in month	Rainfall (mm)	Effective rain (mm)	Harvested water (l)	Municipality water supply (l)	Primary demand (l)	Grey water generated (l)	Irrigation seasonal factor (%)	Irrigation Water demand (l)	Irrigation fresh water demand (l)	Unused grey water (l)	Cooling tower Ussage factor (%)	Cooling tower water demand (l)	Total fresh water demand (l)	Storage (l)	Total water harvested by the end of year	Water harvested after second year
July	31	190	185	1804675	0	1233800	1048730	20%	9300	0	1039430	0%	0	1233800	90000	570875	47602035
August	31	230	225	2194875	0	1233800	1048730	20%	9300	0	1039430	0%	0	1233800	90000	2009805	48563110
September	30	182	177	1726635	0	1194000	1014900	30%	13500	0	1001400	0%	0	1194000	90000	1547535	49095745
October	31	163	158	1541290	0	1233800	1048730	60%	27900	0	1020830	0%	0	1233800	90000	1356220	49403235
November	30	87	82	799910	0	1194000	1014900	60%	27000	0	987900	0%	0	1194000	-304090	620810	49009145
December	31	30	25	243875	0	1233800	1048730	60%	27900	0	1020830	0%	0	1233800	-1294015	58805	48019220
January	31	11	6	58530	0	1233800	1048730	100%	46500	0	1002230	0%	0	1233800	-2469285	-126540	46843950
February	28	12	7	68285	0	1124350	955697.5	100%	42375	0	913322.5	0%	0	1124350	-3525350	-100368	45787885
March	31	10	5	48775	0	1233800	1048730	100%	46500	0	1002230	0%	0	1233800	-4710375	-136295	44602860
April	30	10	5	48775	0	1194000	1014900	100%	45000	0	969900	0%	0	1194000	-5855600	-130325	43457635
May	31	54	49	477995	0	1233800	1048730	60%	27900	0	1020830	0%	0	1233800	-6611405	292925	42701830
June	30	125	120	1170600	0	1194000	1014900	45%	20250	0	994650	0%	0	1194000	-6634805	991500	42678430
																	557765080

02 CARBON EMISSION

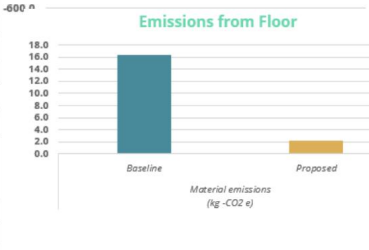
EMBODIED CARBON

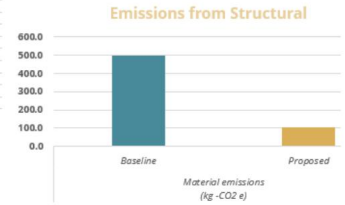
	Material	Unit	Material manufacturing emissions		
			Quantity	Emissions Factor	Material Emissions ($kg\text{-}CO_2\ e$)
System Type Wall	Brick (common/facing)	kg	2588600	0.39	1009554
	Sand	kg	1,858,560	0.009	16727
	Water	l	0	0	0
	Paint	l	28622	0.659	18862
	Cement (ordinary Portla	kg	1490720	0.91	1356555
	Aluminum thin composi	kg	2870	18	51660
System Name Brick	Toughned glass	kg	523173.35	1.667	872130
	Galvanized steel stud	kg	900	3.1	2790

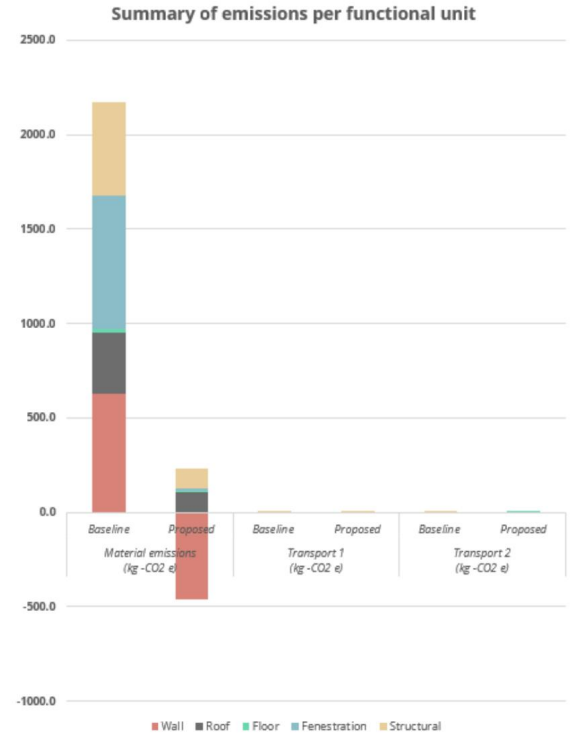




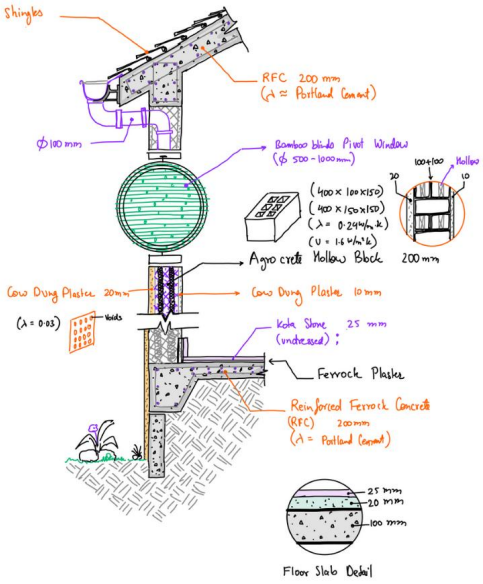
	Material	Unit	Material manufacturing emissions		
			Quantity	Emissions Factor	Material Emissions ($kg\text{-}CO_2\ e$)
System Type Wall	Agrocrete Hollow Block	kg	6,598,750	-0.15	-989813
	Vedic Plaster	kg	34,316,100	-0.08	-2745288
	Ferrock	kg	5,790,250	-0.05	-289513
	AAC	kg	3,167,400	0.5	1583700







CARBON REDUCTION USING MATERIALS



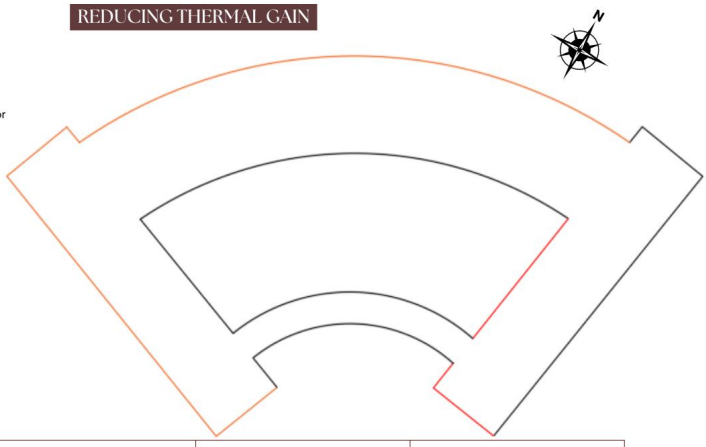
1. **FERROCK INSTEAD OF RCC**
   - Replaces OPC-based concrete with carbon-negative Ferrock (steel dust + waste glass).
   - Strength comparable to RCC; absorbs CO_2 during curing.
   - Eliminates clinker-production emissions (largest source in concrete).
   - Cuts structural embodied carbon by ~90–95%.

2. **AAC + AGROCRETE BLOCKS INSTEAD OF BRICKS**
   - AAC blocks: lightweight, low-density, autoclaved—much lower energy than fired bricks.
   - Agrocrete hollow blocks: agricultural-waste based, >10 MPa strength, low density (1250 kg/m³), <15% water absor
   - No kiln-firing → avoids large thermal energy emissions.
   - Reduces walling-system carbon footprint by 70–80%.

3. **COFFEE HUSK COMPOSITE PANELS INSTEAD OF ALUMINUM PANELS**
   - Aluminum cladding has extremely high embodied carbon (~14–16 kg CO_2e/kg).
   - Coffee-husk panels use agro-waste + bio-resins → low energy, biodegradable.
   - Lightweight, thermally insulating, durable, and low-GWP.
   - Cuts façade GWP by ~90%.

4. **VEDIC PLASTER INSTEAD OF CEMENT PLASTER**
   - Natural mix: lime + clay + cow dung + fibers; no OPC or industrial processing.
   - Provides thermal insulation, humidity control, antifungal properties.
   - Near-zero embodied carbon and locally sourced materials.
   - Reduces plaster-related emissions by ~95%.

REDUCING THERMAL GAIN



U VALUE POTENTIAL

Façade Component	Conventional Material	U-Value (W/m^2K)	Proposed Material System	U-Value (W/m^2K)	% Improvement
Glazing	Single clear glass	**5.6**	6-12-6 mm Double-Glazed Unit (DGU)	**1.8**	**68% better insulation**
External Wall	230 mm Clay Brick	**3.0 – 3.5**	200 mm AAC Block	**0.6 – 0.8**	**75% lower heat transfer**
Internal Wythe / Buffer	Cement–sand plaster	**~2.0**	Agrocrete Hollow Block	**~0.8**	**60% lower conduction**
Structural Element	RCC Column	**3**	1m × 1.5m Stone Column	**~1.8**	**Thermal mass + shading**

02 CARBON EMISSION

LIFE CYCLE COASTING

S.No.	Particulars	Definition	Baseline Estimate (Project Partner / SOR basis)			Proposed Design Estimate		
			Amount (Million INR)	%	Amount (INR per sqm)	Amount (Million INR)	%	Amount (INR per sqm)
1	Land	Cost of land purchased or leased by the Project Partner	11.59	5.6%	2,136	11.59	6.5%	2,136
2	Civil Works	Refer Item A, Civil works in Cost of construction worksheet	35.01	17.0%	6,457	24.94	14.1%	4,598
3	Internal Works	Refer Item B, Civil works in Cost of construction worksheet	16.19	7.9%	2,986	14.55	8.2%	2,684
4	MEP Services	Refer Item C, Civil works in Cost of construction worksheet	12.06	5.8%	2,224	9.56	5.4%	1,762
5	Equipment & Furnishing	Refer Item D, Civil works in Cost of construction worksheet	56.30	27.3%	10,381	53.38	30.2%	9,843
6	Landscape & Site Development	Refer Item E, Civil works in Cost of construction worksheet	20.01	9.7%	3,690	16.87	9.5%	3,111
7	Contingency	Amount added to the total estimate for incidental and miscellaneous expenses.	2.79	1.4%	515	2.39	1.3%	440
	TOTAL HARD COST		**154.0**	**75%**	**28,389**	**133.3**	**75%**	**24,574**

LIFE CYCLE COST OF BUILDING

BASE CASE

Time (Year)	Capital Cost (INR Million)	Annual Maintanance (INR Million)	Utility Cost (INR Million)	Replacement Cost (INR Million)	Total Cost (INR Million)
0	206.1	3	10	0	219.1
1		3.06	10.2		13.26
2		3.1212	10.404		13.5252
3		3.183624	10.61208		13.795704
4		3.24729648	10.824322		14.07161808
5		3.31224241	11.040808		14.35305044
6		3.37848726	11.261624		14.64011145
7		3.446057	11.486857		14.93291368
8		3.51497814	11.716594	0.6	15.83157195
9		3.58527771	11.950926		15.53620339
10		3.65698326	12.189944		15.84692746
11		3.73012293	12.433743		16.16386601
12		3.80472538	12.682418	1.5	17.98714333
13		3.88081989	12.936066		16.8168862
14		3.95843629	13.194788		17.15322392
15		4.03760501	13.458683		17.4962884
16		4.11835712	13.727857	0.6	18.44621417
17		4.20072426	14.002414		18.20313845
18		4.28473874	14.282462		18.56720122
19		4.37043352	14.568112		18.93854524
20		4.45784219	14.859474		19.31731615
21		4.54699903	15.156663		19.70366247
22		4.63793901	15.459797		20.09773572
23		4.73069779	15.768993		20.49969043
24		4.82531175	16.084372	1.5	22.40968424
25		4.92181798	16.40606		21.32787793

Discount Rate	10%
Life Cycle Cost	**360.79**

PROPOSED CASE

Time	Capital Cost	Annual Maintanance	Utility	Replacement	Total Cost (INR Million)
0	176.9	0.8	0.05	0	177.75
1		0.816	0.051	0	0.867
2		0.83232	0.05202	0	0.88434
3		0.8489664	0.0530604	0	0.9020268
4		0.865945728	0.0541216	0.075	0.9950673
5		0.883264643	0.055204	0	0.9384687
6		0.900929935	0.0563081	0	0.9572381
7		0.918948534	0.0574343	0	0.9763828
8		0.937327505	0.058583	0	0.9959105
9		0.956074055	0.0597546	0.075	1.0908287
10		0.975195536	0.0609497	0	1.0361453
11		0.994699447	0.0621687	0	1.0568682
12		1.014593436	0.0634121	1	2.0780055
13		1.034885304	0.0646803	0	1.0995656
14		1.05558301	0.0659739	0.075	1.1965569
15		1.076694671	0.0672934	0	1.1439881
16		1.098228564	0.0686393	0	1.1668678
17		1.120193135	0.0700121	0	1.1902052
18		1.142596998	0.0714123	0	1.2140093
19		1.165448938	0.0728406	0.075	1.3132895
20		1.188757917	0.0742974	0	1.2630553
21		1.212533075	0.0757833	0	1.2883164
22		1.236783737	0.077299	0	1.3140827
23		1.261519411	0.078845	1	2.3403644
24		1.2867498	0.0804219	0.075	1.4421717
25		1.312484796	0.0820303	0	1.3945151

Discount Rate	10%
Life Cycle Cost	**187.50**

LIFE CYCLE COST OF DIESEL GENERATOR VS BIO GAS GENERATOR

BASE CASE (DIESEL GENRATOR)

Time (Year)	Capital Cost (INR Million)	Annual Maintenance (INR Million)	Utility Cost (INR Million)	Replacement Cost (INR Million)	Total Cost (INR Million)
1	1.5	0.1	7	0	8.6
2	0	0.11	7.14	0	7.25
3	0	0.11	7.2828	0	7.3928
4	0	0.12	7.428456	0	7.548456
5	0	0.12	7.5770251	0	7.69702512
6	0	0.13	7.7285656	0	7.858565622
7	0	0.13	7.8831369	0	8.013136935
8	0	0.14	8.0407997	0	8.180799674
9	0	0.15	8.2016157	0	8.351615667
10	0	0.16	8.365648	0	8.52564798
11	0	0.16	8.5329609	0	8.69296094
12	0	0.17	8.7036202	1.5	10.37362016
13	0	0.18	8.8776926	0	9.057692562
14	0	0.19	9.0552464	0	9.245246413
15	0	0.2	9.2363513	0	9.436351341
16	0	0.21	9.4210784	0	9.631078368
17	0	0.22	9.6094999	0	9.829499936
18	0	0.23	9.8016899	0	10.03168993
19	0	0.24	9.9977237	0	10.23772373
20	0	0.25	10.197678	0	10.44767821
21	0	0.27	10.401632	0	10.67163177
22	0	0.28	10.609664	0	10.88966441
23	0	0.29	10.821858	0	11.1118577
24	0	0.31	11.038295	1.5	12.84829485
25	0	0.32	11.259061	0	11.57906075

LIFE CYCLE COST	233.50

PROPOSED CASE (BIOGAS GENRATOR)

Time	Capital Cost	Annual Maintenance	Utility	Replacement	Total Cost (INR Million)
1	1	0.15	0	0	1.15
2	0	0.16	0	0	0.16
3	0	0.17	0	0	0.17
4	0	0.17	0	0	0.17
5	0	0.18	0	0	0.18
6	0	0.19	0	0	0.19
7	0	0.2	0	0	0.2
8	0	0.21	0	0	0.21
9	0	0.22	0	0	0.22
10	0	0.23	0	0	0.23
11	0	0.24	0	0	0.24
12	0	0.26	0	1	1.26
13	0	0.27	0	0	0.27
14	0	0.28	0	0	0.28
15	0	0.3	0	0	0.3
16	0	0.31	0	0	0.31
17	0	0.33	0	0	0.33
18	0	0.34	0	0	0.34
19	0	0.36	0	0	0.36
20	0	0.38	0	0	0.38
21	0	0.4	0	0	0.4
22	0	0.42	0	0	0.42
23	0	0.44	0	0	0.44
24	0	0.46	0	1	1.46
25	0	0.48	0	0	0.48

LIFE CYCLE COST	10.15

















